TECHNOLOGY DEPARTMENT

ROADS AND STREETS

OCTOBER 1947

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DETROIT

Uniform Performance

an outstanding Quality of TIMKEN BITS

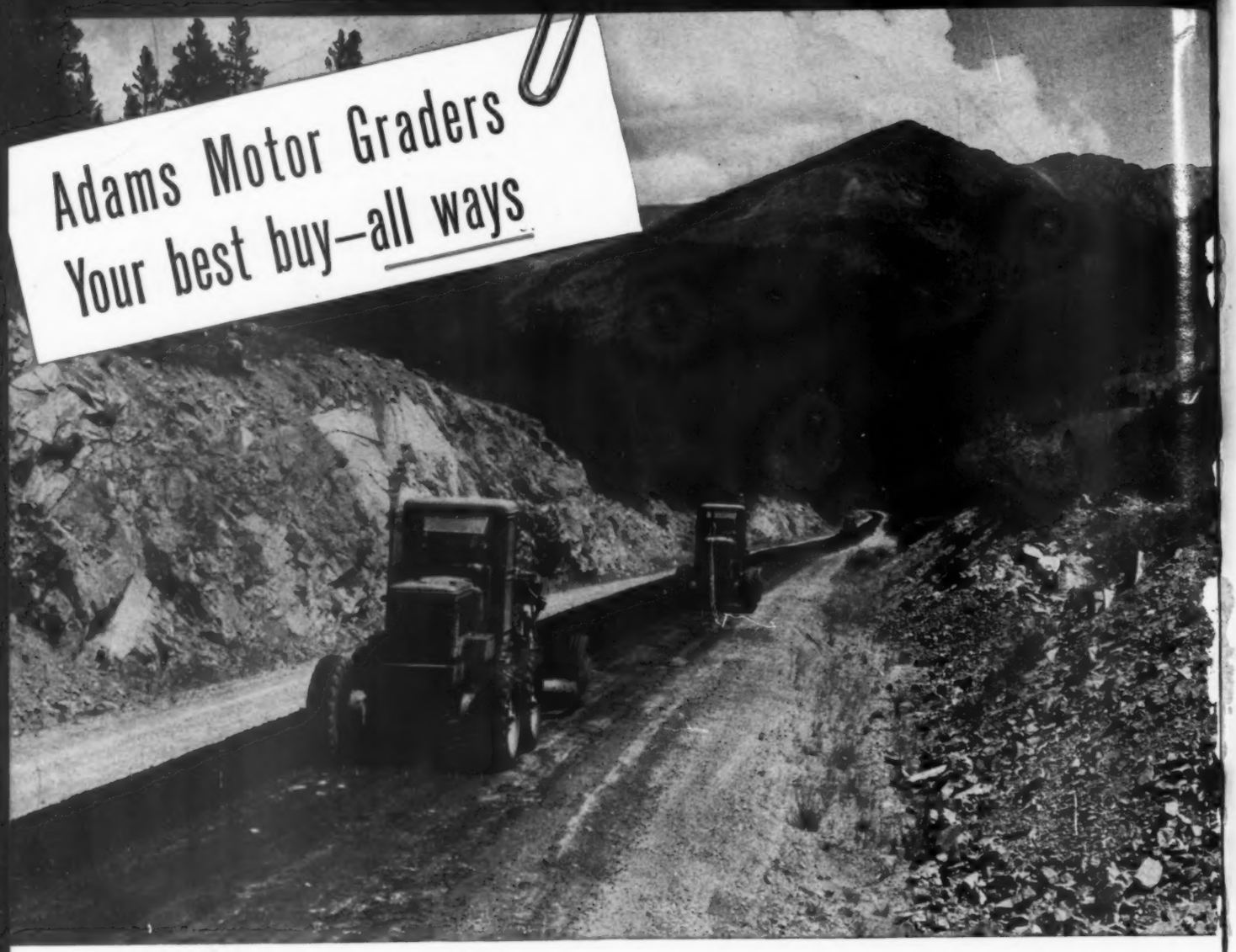
The ability of Timken Rock Bits to drill faster and further in any kind of rock has made them preferred wherever rock is drilled — in mining, construction and quarrying.

Equally important to their users however — even rated first by some — is uniformity of performance. This means that every Timken Bit will give the same outstanding service in speed of penetration and distance drilled when used in the same kind of rock.

This uniformity is due to the development of the special Timken Steel used in the production of Timken Bits and to Timken metallurgical "know how" in heat treatment and hardening.

Wherever you are, there's a Timken Rock Bit distributor within telephone call. Conversion and reconditioning shops also are conveniently located for quick service. Put Timken Bits to work now and cut your drilling costs while increasing production. The Timken Roller Bearing Company, Canton 6, Ohio.

TIMKEN
TRADE-MARK REG. U. S. PAT. OFF.
ROCK BITS



8 Forward Speeds

SAVE TRAVEL TIME • SPEED OPERATIONS • CUT JOB COSTS

REGARDLESS of the type work you are doing—ditch cutting, bank cutting, blading, scarifying, aggregate mixing, spreading—Adams' 8 overlapping forward speeds provide instantly the right speed for doing the job at the fastest practical rate.

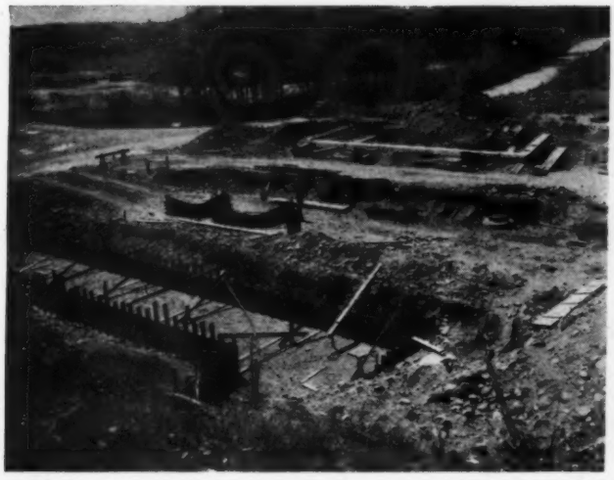
This means *more efficient work—more work per day—more profitable operation.* And Adams' high transport speeds (up to 21 m.p.h.) importantly reduce costly, non-productive travel time to jobs and between jobs.

Visit your local Adams dealer. He'll show you how and why Adams Motor Graders are *your best buy—in this way—and all ways.*

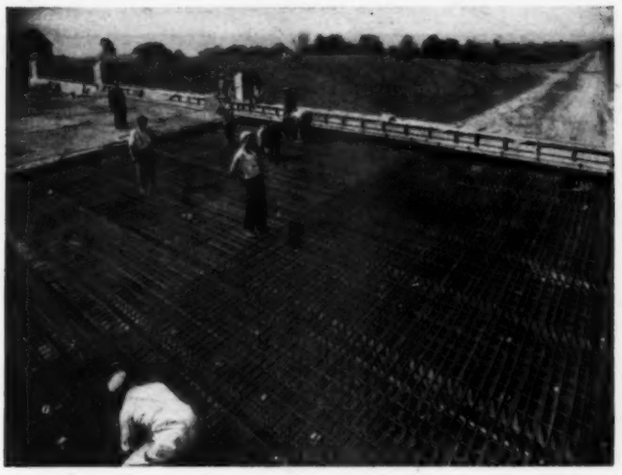
J. D. ADAMS MANUFACTURING CO. • INDIANAPOLIS, INDIANA

Adams

MOTOR GRADERS • LEANING WHEEL GRADERS • ELEVATING GRADERS



Skiff St. Bridge, Hamden, will have two spans of 45 ft, 3 in. Old road (top, right) is to be relocated to cross parkway. Contractor: D. V. Frione & Company, Inc., New Haven, Conn.



Bethlehem Reinforcing Bars in construction of Hall Avenue Bridge, Wallingford. Bridge has two spans of 49 ft, 3 in., and crosses parkway. Contractor: D. Arrigoni, Middletown, Conn.

Bridge construction along Parkway in Connecticut

Named for a former governor, the Wilbur Cross Parkway is to be a vital link in Connecticut's chain of express highways which will ultimately cross the state from a point near Mashapaug, at the Massachusetts-Connecticut line, to New Haven, then turn southwestward to New York's Westchester County.

Some thirty miles in length, the new parkway is already carrying traffic over its western and northern extremities, and is now rapidly taking shape between New Haven and Meriden. In line with Connecticut's policy of grade-crossing elimination, its construction includes the erection of numerous bridges, some of which are shown here. Reinforcing steel for these bridge structures was furnished by Bethlehem.

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.
On the Pacific Coast Bethlehem products are sold by
Bethlehem Pacific Coast Steel Corporation
Export Distributor: Bethlehem Steel Export Corporation

STEEL FOR HIGHWAYS

Road Joints • Reinforcing Bars • Bar Mats • Guard Rail • Tie-Rods
Guard Rail Posts and Brackets • Spikes • Wire Rope and Strand
Hollow Drill Steel • Fabricated Structural Steel
Bolts and Nuts • Sheet and H-Piling • Timber Bridge Hardware

BETHLEHEM STEEL

Baldwin Avenue Bridge, Meriden. Two spans of 48 ft. Here parkway is already in use, but island is yet to be landscaped. Contractor: Arute Brothers, Inc., New Britain, Conn.

Railroad bridge at Wallingford has span of 72 ft, carries parkway over tracks of New York, New Haven and Hartford R. R. Contractor: M. A. Gammino Construction Co., Providence, R. I.

Showing Bethlehem Reinforcing Bars in 106-ft-span Dixwell Ave. Bridge, Hamden. Parkway to cross existing roadway here. Contractor: The Mariani Construction Co., New Haven, Conn.

ROADS AND STREETS

OCTOBER, 1947 ● VOL. 90 ● No. 10

With Roads and Streets Have Been Combined Good Roads Magazine And Engineering & Contracting

Coming Articles

4½-mile Concrete Haul in Non-agitating Truck Bodies

. . . as employed by Milwaukee contractor on street job; useful data on this type of concrete transporting equipment.

What City Engineers are Planning and Thinking

Report of American Public Works Ass'n. annual convention at Jacksonville, Oct. 5-8.

Underground Sampling of Soil Tube Method

By O. J. Porter, consulting engineer; description of California practice and latest labor and time saving heavy-duty drilling equipment.

Building Chicago's "Seawall"

Features of heavy stone revetment program along Chicago's lakeshore, described by an authority who had responsible part in work.

Estimating Methods for Aggregate Production

As used by one state highway department for engineer estimates, involving realistic figuring of job.

Snow Removal Plan for an Eastern State

Fast Pace Set on Concrete Road Job In New York

Unique Synchronized Automatic Signal System for 4-Way Street System at Houston

And other construction job reports from nation-wide summer travels by the R and S staff.

To Start Soon—
authoritative series of fundamental review articles on what we know about Soil Stabilization and Compaction

HAROLD J. MCKEEVER, Editor
C. T. MURRAY, Managing Editor
H. K. GLIDDEN, Contributing Editor
V. J. BROWN, Consulting Editor

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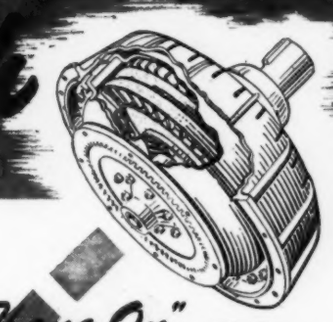
A magazine devoted to the design, construction, maintenance and operation of highways, streets, bridges, bridge foundations and grade separations, and to the construction and maintenance of airports.

Gillette Publishing Company
Publication and Editorial Offices,
22 West Maple Street, Chicago 10, Ill.

HALBERT P. GILLETTE, President; EDWARD S. GILLETTE, Publisher; H. J. CONWAY, Advertising Manager; Chicago Office: E. C. KELLY, E. H. HICKEY; New York Office: J. M. ANGELL, Manager, 155 E. 44th Street; Cleveland Office: LEE B. MCMAHON, Manager, Leader Building; Los Angeles: DON HARWAY, West Coast Representative, 1709 W. 8th Street.

Acceptance under the Act of June 5, 1934, authorized Jan. 25, 1938, at Chicago, Ill. Published monthly. Subscription price $5.00 per year.

THE "820" CAN DO MORE...
CAN TAKE MORE... *because*
the hydraulic clutch



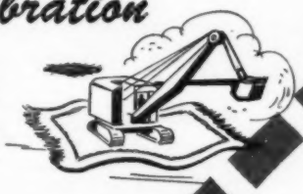
Absorbs Shock

The L-820 is free from the inevitable and unavoidable shocks and impacts, resulting from heavy-duty digging, because its Hydraulic Clutch absorbs and cushions the costly strains and stresses on the mechanism and cables.

Improves "Hang On"

You can "slug it ... with rock knowing that the ...0's great digging power w... fade or fizzle but will "hang ... until the most unyielding rock ... in the dipper.

Reduces Vibration



The L-820 is a smooth operator because the Hydraulic Clutch eliminates shake and shock.

Prevents Stalling

You can't stall the engine under any digging circumstances.

2 yd. Lorain of C. J. Langenfelder & Son, Inc., averages 7000 yds. every 20 hours at Baltimore's new Friendship Airport.

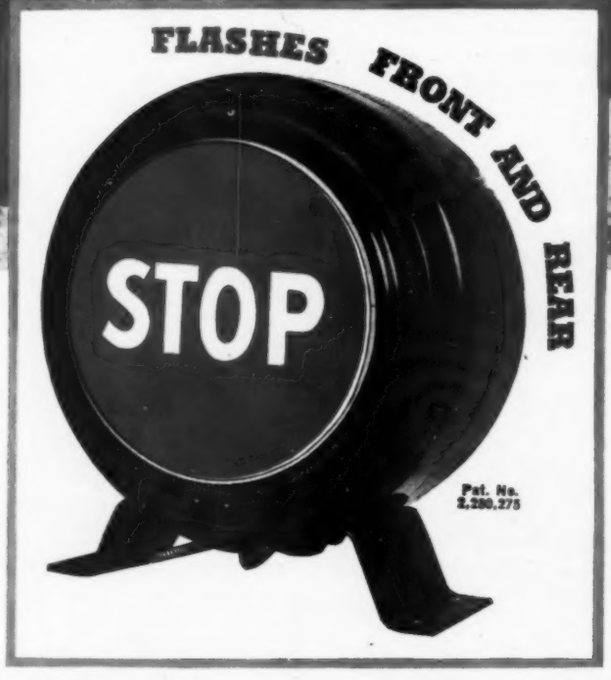
This and many other important features of the 2 yd. Lorain-820 are described completely in a new catalog just off the press. Ask your local Thew-Lorain distributor for a copy today.

THE THEW SHOVEL COMPANY • LORAIN, OHIO

Thew **Lorain® 820**

. . . thanks to the use of this flashing light that warns two ways at once.

You, too, can make your streets and highways safer by equipping your vehicles with Keystone Flashing Lights. These are the only lights to flash 80 "STOP" warnings per minute to both front and rear. Completely visible through swirling snow. Act as a "lighthouse" to promote highway safety.



Used in all snow states on highway plows, and by cities, counties, towns, park and bridge commissions, public utilities, etc. on all types of vehicles. Write us to send you a light for inspection. Auto Gear & Parts Co., Inc., 16th St. & Hunting Park Ave., Philadelphia 40, Penna.

Heavy-duty light that won't shake apart. Water can't get in and short them. Mounted anywhere on vehicle. Supplied with 6½ inch red lenses lettered "STOP" or with plain red, amber or blue lenses, for 6 and 12 volt systems.

KEYSTONE *FLASHING* LIGHT

The "Lighthouse" of the Highway

SPOT IT WHERE YOU WANT IT

with the MultiFoote Elevating Boom!

Think over what a setup like this saves you. Here you have the new MultiFoote Duo-Mix 34-E with the MultiFoote Elevating Boom feeding a Pumpcrete.

Here is a high capacity, smooth operation that puts the concrete where you want it without the complications of Shooting Towers, Cranes or other devices.

The MultiFoote Elevating Boom dumps right to the Pumpcrete Hopper or it will discharge to forms for abutment reenforced concrete walls or footings to heights up to 18½ Ft. No crane is necessary. Bucket travel is rapid and it can be adjusted to travel and hang in a level position regardless of the boom angle.

The MultiFoote Elevating Boom means less investment for equipment, less handling of materials, faster pouring and greater profit. It is available for both single and double drum MultiFoote Pavers and can be installed on models in the field.

THE FOOTE COMPANY, INC.
1936 State Street • Nunda, New York

MULTIFOOTE
CONCRETE PAVERS

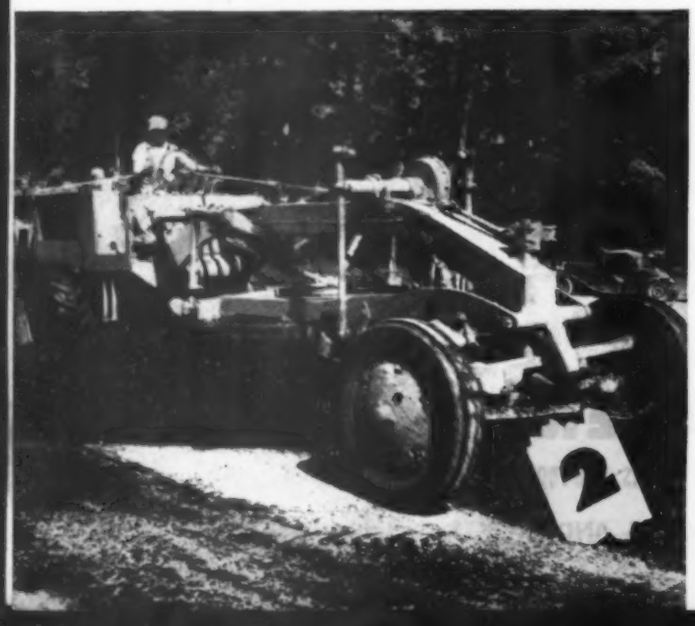
Builders of ADNUN BLACKTOP PAVERS, MULTIFOOTE CONCRETE PAVERS; AND FOOTE KINETIC MIXERS

UTILITY

1 A "Caterpillar" Diesel No. 12 Motor Grader shapes ditches on a county road in Crawford County, Mich. The big tires give excellent control in sandy soil.

2 Tullahoma, Tenn., a "Caterpillar" Diesel No. 12 Motor Grader blades cold mix rock asphalt on what is claimed the widest road in the world.

3 Near Sebeka, Minn., this Wadena County "Caterpillar" Diesel No. 12 is maintaining a stretch of sandy road.



UNLIMITED

No machines on earth have greater year-round utility in the road-building field than "Caterpillar" Diesel Motor Graders. They were the first machines designed specifically to do the job, and they have increased their margin of leadership for 15 years.

These pictures, chosen from thousands, show the variety of jobs they do superlatively well:

1. **Build and rebuild roads from bank to bank.**
2. **Spread all types of surface materials, including oil mix.**
3. **Maintain every kind of highway that requires maintenance.**
4. **Keep roads clear of snow and ice through the winter months.**

Many owners are frank in their praise of "Caterpillar" Diesel Motor Graders and the dependable work-power they deliver. Here is a statement from Road Supervisor R. H. Parker, of Sevier County, Utah:

"It's the best grader for our work. Its handling ease and low operating cost mean a lot to us. We wouldn't have anything else. It's 'Caterpillar' all the way with us."

And Contractor Ellis Fesler, of Santa Maria, California, says:

"Ease of operation and 'Caterpillar' dependability make our No. 12 Grader an excellent blade for oil-field road work. It enables us to produce first-class roads with a minimum of effort."

CATERPILLAR TRACTOR CO. • PEORIA, ILLINOIS

The New No. 12 and No. 112 Motor Graders

See the new No. 12 and No. 112 Motor Graders, with one-third more horsepower, strengthened design and many mechanical refinements. Their greater work capacity and faster working speeds will mean higher earnings and savings on all types of road jobs.

4 Clearing drifts of frozen snow up to 6 feet deep is one of the many efficient jobs done by this No. 12 in Marshall County, Ill.

CATERPILLAR DIESEL

REG. U. S. PAT. OFF.

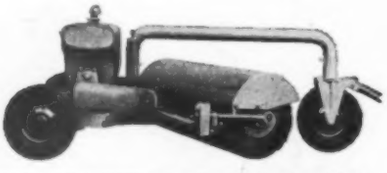
ENGINES • TRACTORS • MOTOR GRADERS • EARTHMOVING EQUIPMENT

LITTLEFORD'S BIG 4 HAVE ALL THE ANSWERS

SPRAY MASTER Pressure Distributor applies asphalt, road oils, emulsion with bar up to 24 feet wide. One valve operates entire spray.

LITTLE JOE KNOWS LITTLEFORD

TANKAR STEAM HEATER develops steam in two minutes, heats tank cars in ⅓ less time. Small, compact, completely automatic, easy to trail.



No. 108 POWER DRIVEN BROOM sweeps in either direction, only two minutes to change. Hydraulic lift regulates brush tension. Many other features.

SUPPLY TANKS, semi-trailer or truck types; standard frame, or famous frameless construction. Sizes from 1250 to 4000 gallons.

Little Joe listens in on the "power politics" of Littleford equipment and reports as follows: Whatever your job of black top construction or maintenance, these Littleford units will handle it swiftly, efficiently, economically. Littleford long has made black top road work the object of its engineering skill and equipment-building facilities. Littleford equipment has many exclusive features and operating advantages, some of which are listed above. And there are alternate units, too, which may also interest you. Get the complete story by writing us today. Speed up and improve your black top work!

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LITTLEFORD BROS., Inc.

454 E. PEARL ST., CINCINNATI 2, OHIO

20% to 30% more footage

AIR PLUS

with Jaeger Model 600

Compressor behind your wagon drills

600 cu. ft. of air per minute, delivered at standard engine speed, operates two big 4″ drills at top efficiency plus hand-held drill for secondary work.

Gives you the world's fastest drilling team on wheels, with a more portable compressor than your old 500 ft. machine.

Jaeger engineering, applied to biggest portable compressors, provides the 100 additional cubic feet of air you need to keep two wagon drills under full operating pressure and also handle secondary drilling, without wasteful engine speeds or a bigger, clumsier machine. The Model 600 "AIR PLUS" is powered with Murphy ME-66 Diesel, operating at 1225 r.p.m., and ruggedly but compactly designed to trail wherever big material trucks can travel. Built to micro-precision standards with giant "ultra lapped" valves, 100% efficient air intercooling and automatic drainage, it delivers this air at 100 lbs. pressure within 100° of ambient temperature and with a minimum of moisture. Full force feed lubrication, oversize air receiver and tool boxes, electric starter, sectional radiator and intercooler, etc. are standard.

Other Jaeger "AIR PLUS" Compressors with these same features are available in 60 to 500 ft. sizes — gasoline, diesel or electric powered. See your Jaeger distributor.

THE JAEGER MACHINE COMPANY, Columbus 16, Ohio

REGIONAL OFFICES: 8 E. 48th St. NEW YORK 17, N. Y. · 226 N. LaSalle St. CHICAGO 1, ILL. · 235 American Life Bldg. BIRMINGHAM 1, ALA.

JAEGER Spreaders, Finishers

"SPEEDLINE" Concrete Mixers

"SURE PRIME" Contractors Pumps

JAEGER *Engineered* **EQUIPMENT**

"DUAL-MIX" TRUCK MIXERS, AGITATORS — HOISTING ENGINES, SELF-RAISING TOWERS — CONCRETE AND BITUMINOUS PAVING EQUIPMENT

Don't buy any DOZER the revolutionary

The Tournadozer is correctly designed for efficient pushing as well as dozing. Increasing load on blade puts more weight onto Tournadozer's giant rubber tires giving more traction for greater pushing power. Maneuverability through high speeds in forward or reverse means more scraper units served per pusher . . . less waiting time.

Big 21.00 x 25 rubber tires on the Tournadozer provide plenty of flotation and traction . . . eliminate multiple moving parts constantly operating in grinding dirt. Tapered bead tire and rim design prevent tire slippage . . . permit lowering tire pressures for extra flotation to meet extreme conditions in sand or mud, ice or snow.

Finger touch selection is instantaneous for any one of four gear combinations that drive the Tournadozer . . . 1.91 to 15 m.p.h. both forward or reverse. Constant mesh Tournamatic transmission with air-actuated controls eliminates conventional gear shifting, simplifies operation.

Air actuated controls throughout, low pressure shock-absorbing tires, good visibility and a special hydraulic suspension seat reduce operator fatigue. He's happier because he drives a faster, snappier, easier riding rig . . . gets more work done . . . no end-of-day letdown.

LETOURNEAU LET EQUIPMENT

See your Le Tourneau Distributor NOW for complete information

until you've seen NEW TOURNADOZER

THE NEW high-speed, rubber-tired Tournadozer is built for both dozing and pushing . . . ideal for road construction, maintenance, backfilling, clearing and leveling land, building dams or levees, stripping, conveyor and hopper loading, and for pusher service on scraper dirtmoving. Travels two to three times faster than crawler-tractor. No delay in shifting gears with Tournamatic constant-mesh transmission. Quick on-the-job or job-to-job moves . . . no hauling equipment needed . . . travels on pavement, black-top, or cross country. Gets more jobs completed at lower cost per job. Wait till you see this Tournadozer in operation before buying any ordinary dozer!

Tournadozer, Tournamatic—Trademark R113 c

Model C

- Speeds up to 15 m.p.h., forward and REVERSE
  4-speed selections from 1.91 m.p.h.
- Non-stop, instantaneous speed selection
  Constant-mesh Tournamatic transmission.
- Easy to operate . . . air actuated controls
  Finger-tip steering and blade operation . . . single pedal for brakes.
- Tapered bead tires . . . 21.00x25
  Permit lower pressure for operation in sand or muck.
- Big load capacity . . . 11' 2"x43" blade
  Lift 44", drop, unlimited; cable control; fast-acting.
- 180 h.p. Diesel . . . weight 15 ½ tons.

LETOURNEAU PEORIA, ILLINOIS HIGH-SPEED RUBBER-TIRED TOURNADOZERS

THIS DRAGLINE COST $36,000

. . . but it can't work!

● This is a dragline and it cost approximately $36,000—but it can't do a lick of work because the wire rope is missing. How much does the rope cost? Ordinary wire rope—about $217. The best wire rope—Preformed Improved Plow Steel—about $260!

Specify Preformed Improved Plow Steel when you order for replacement. And when you buy such a machine, tell the manufacturer to equip it with Preformed Improved Plow Steel.

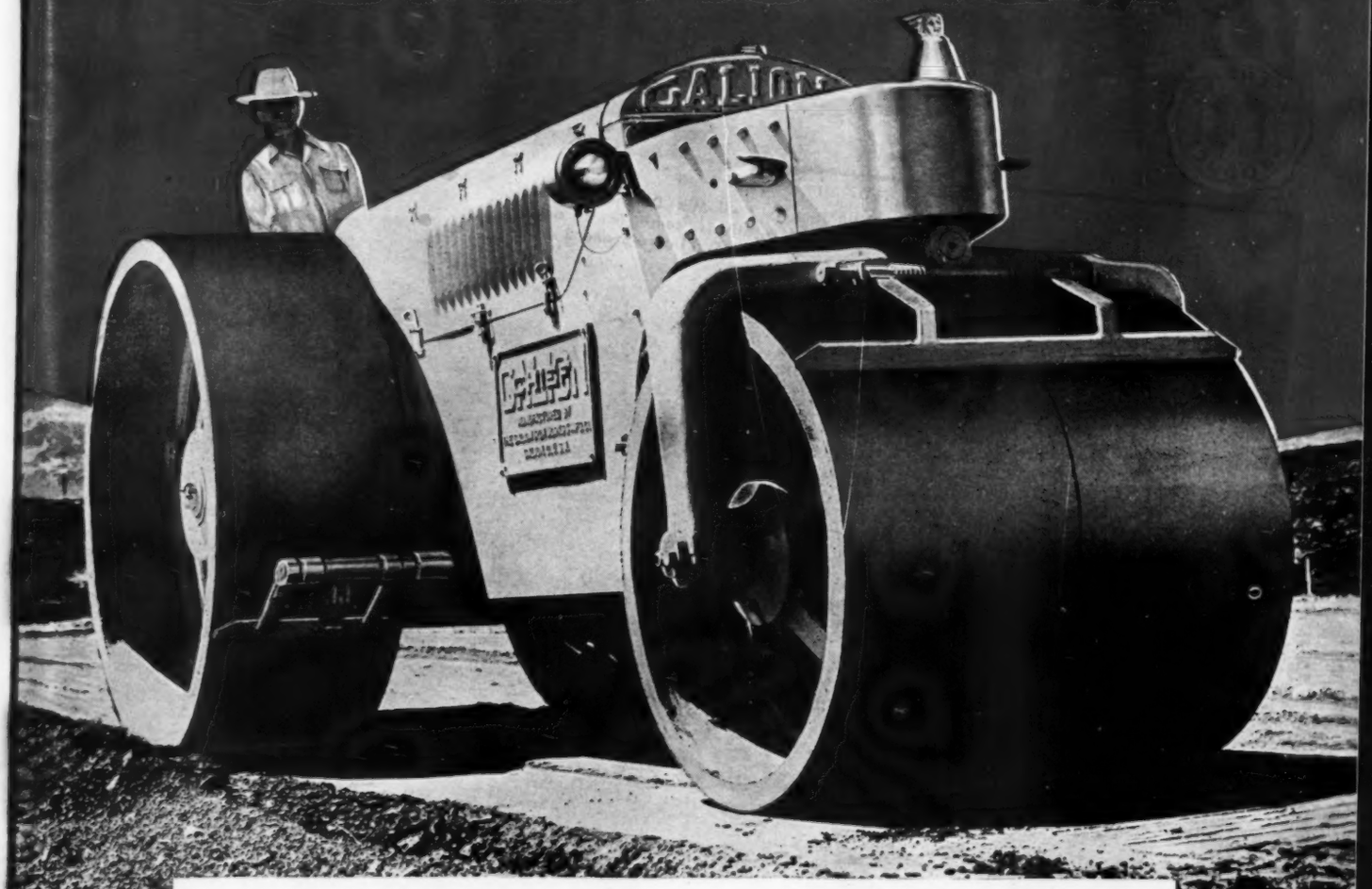
It lasts longer, is easier and safer to handle; it's more flexible and spools better.

WRITE FOR FREE COPY of helpful book about Preformed. Address: Preformed Wire Rope Information Bureau, 520 North Michigan Ave., Chicago 11.

ASK YOUR OWN WIRE ROPE MANUFACTURER OR DISTRIBUTOR

HANDLES EASIER - LASTS LONGER

For a Real Job of COMPACTION



Features of GALION 3-WHEEL ROLLERS

- Good visibility of work. . . . . .
- Hydraulic steering. . .Simple operating controls. . . . . .
- Large diameter rolls. . . . . .
- Heavy-duty roller bearings at all vital points. . . . . .
- Sub-frame mounting of engine and transmission to protect them from operating stresses. Extra-rugged construction throughout.
- Multiple plate clutches for positive action, smooth operation.
- Powerful, quick-starting, diesel or gasoline engine. . . . . .

40 YEARS OF EXPERIENCE

GALION
1907 - 1947

The GALION IRON WORKS & MFG. COMPANY
General and Export Sales Offices
Galion, Ohio, U. S. A.

Write for Catalog No. 294

GRADERS · ROLLERS

DANDIE-Mixed Concrete is high quality concrete

KOEHRING PRODUCT

Faster charging. No choking at skip throat. Dandie Selective Skip Shaker shakes only when skip is ready for shaking, not before.

Kwik-Mix Dandie Concrete Mixers come in 4 sizes: 16-S, 11-S, 6-S and 3½-S.

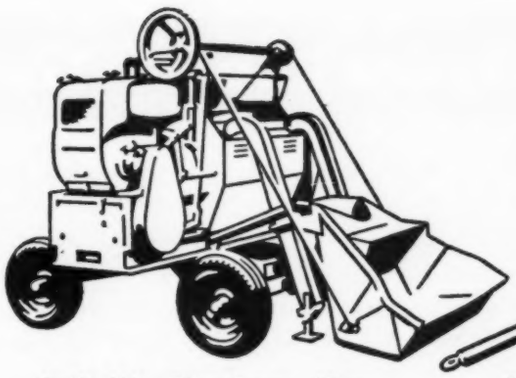
Fully-mixed concrete every batch. Blade and bucket combination inside Dandie Drum completely cement-coats every bit of the aggregate.

Tilted Flow-Line Discharge Chute, also exclusive on the Dandie Mixers, empties drum faster, completely. Natural flow-line of concrete inside drum is continued when discharging.

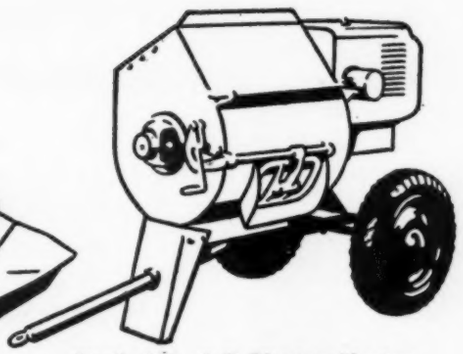
KWIK-MIX COMPANY

KOEHRING SUBSIDIARY • PORT WASHINGTON, WISCONSIN

Kwik-Mix Dandie concrete mixers in the 3½-S size come in three types: side discharge tilter, end discharge tilter, and end discharge non-tilter.



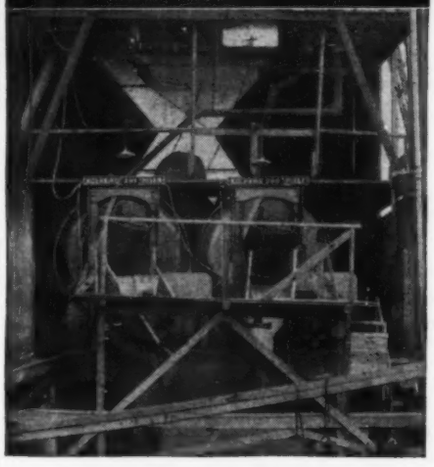
Kwik-Mix Bituminous Non-Tilting mixers cut patching time. End discharge makes possible direct pouring into break. 14, 10 cubic foot sizes.



Kwik-Mix 6-P Plaster-Mortar Mixer does away with back-breaking tilting. Big discharge door, easily opened, discharges batch in 7 seconds.

KOEHRING

1-yd., 2-yd., 3-yd.
CONCRETE MIXERS

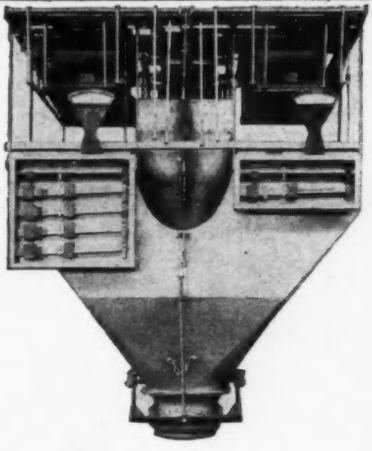


Heavy-Duty Mixers for Central Mix Plants

Big brothers of the Kwik-Mix Dandie line, Koehring Heavy-Duty Construction Mixers are built for long, tough service and high production standards. Gears fully enclosed. Main frame all-welded. Flow-line discharge chute power-operated.

JOHNSON

Concentric
BATCHER



Fast Batching Cycle . . . Weighs Cement Separately

Assures accurate batching control of cement, sand and aggregate for high quality uniform concrete in central mix plants. Centralized control. Faster batching cycle. Pre-mixes, pre-shrinks all ingredients. Eliminates dusting, gumming.

PARSONS

200 Wheel
TRENCHLINER

Latest Postwar Design for High Speed Production

Latest addition to the Parsons line. Built for mile-a-day pipeline work, farm and railroad drainage. "Double Pivot" mounting of wheel simplifies fine grading of trench bottom. Improved wheel support. Gears fully enclosed in one gear case.

KOEHRING COMPANY
MILWAUKEE 10 WISCONSIN

C. S. JOHNSON COMPANY
CHAMPAIGN ILLINOIS

PARSONS COMPANY
NEWTON IOWA

Wickwire Rope is "Tissue Tested"

With the same scientific care a physician uses in examining human tissue, technicians in the Physical Testing Laboratory of Wickwire Spencer's Rope Mill test samples of wire imbedded in plastic "buttons." Samples from coils of wire are ground, polished, etched, microscopically examined and the findings recorded.

What's this got to do with wire rope? The grain size has an important bearing on the life span of the wire. Because the quality of the steel in the rope wire is just as important for dependable service as is the construction of the rope, Wickwire uses only such wire as passes the Physical Testing Laboratory's exacting standards.

For the utmost in performance, safety and long life, specify Wickwire Rope. It is available in all sizes and constructions, both regular lay and WISSCOLAY *Pre*formed. Call on Wickwire distributors and Wire Rope engineers to help solve your wire rope problems and supply the right rope for your needs.

HOW TO PROLONG ROPE LIFE AND LESSEN ROPE COSTS

Thousands of wire rope users have found that the information packed in the pages of "Know Your Ropes" has made work easier and rope last longer. It's full of suggestions on proper selection, application and usage of wire rope. It's easy-to-read and profusely illustrated. For your free copy, write, Wire Rope Sales Office, Wickwire Spencer Steel, Palmer, Massachusetts.

WICKWIRE ROPE

A PRODUCT OF THE WICKWIRE SPENCER STEEL DIVISION OF THE COLORADO FUEL AND IRON CORPORATION

CF&I & SUBSIDIARIES

WIRE ROPE SALES OFFICE AND PLANT—Palmer, Mass. **EXECUTIVE OFFICE**—500 Fifth Avenue, New York 18, N. Y.

SALES OFFICES—Abilene (Tex.) • Boston • Buffalo • Chattanooga • Chicago • Denver • Detroit • Emlenton (Pa.) • Philadelphia • Tulsa • Fort Worth • Houston • New York

PACIFIC COAST SUBSIDIARY—The California Wire Cloth Corporation, Oakland 6, California

THE HUBER ROAD MAINTAINER

PATCH ROLLER

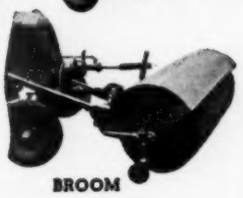
CAB

LIFT LOADER

ONE WAY SNOWPLOW

TWO WAY SNOWPLOW

BULLDOZER



BROOM

HUBER

OFFERS A COMPLETE LINE OF PROVEN ROAD MACHINERY

To standardize on Huber Road Machinery is to place your road, street, highway and airport construction and maintenance requirements in the hands of a capable organization of long experience and thoroughly acquainted with your problems.

THE HUBER ROAD MAINTAINER

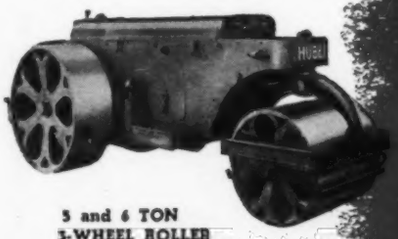
is a versatile, dependable, economical machine that through its auxiliary units makes it a "One Man Maintenance Crew" for all types of year 'round maintenance work.

HUBER 3-WHEEL ROLLERS

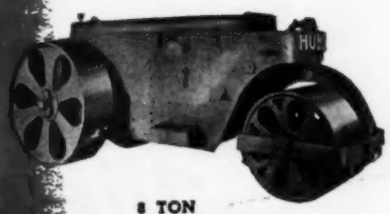
Built in sizes from 5 to 12 tons – powered with either heavy duty 6 cylinder gasoline or Diesel engines. Dependable – economical – powerful.

HUBER VARIABLE WEIGHT TANDEM ROLLERS

5 to 12 Ton capacities – modern design – streamlined, sturdy construction – three speeds forward and reverse – dual control – and many other desirable Huber features. (Also a 3-4 Ton Trailer)



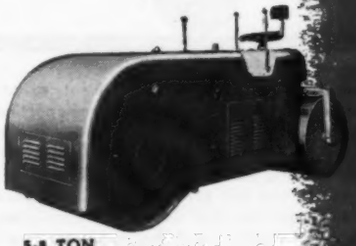
5 and 6 TON 3-WHEEL ROLLER



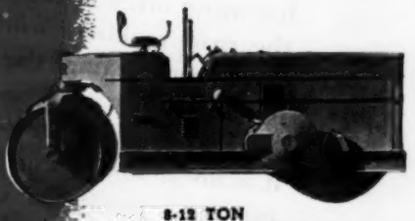
8 TON 3-WHEEL ROLLER

10-12 TON 3-WHEEL ROLLER

3-4 TON TANDEM ROLLER



5-8 TON TANDEM ROLLER



8-12 TON TANDEM ROLLER

THE HUBER MFG. COMPANY • MARION, OHIO, U. S. A.

HUBER

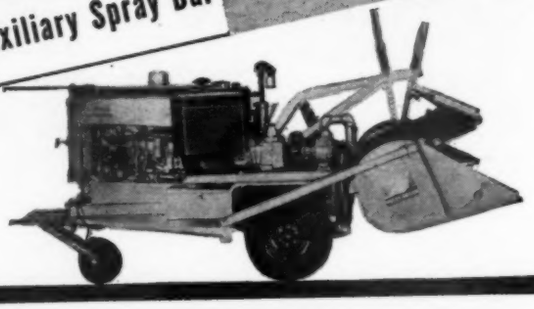
3 Wheel • Tandem ROAD ROLLERS and MAINTAINERS

It's widely granted that the SEAMAN is highly versatile in the solving of road-mix problems, — turning out, even under adverse conditions an intimate, homogenous mix with perfect control of voids. It's an accepted fact that for the SEAMAN, mixing for all types of bituminous construction is as easy as for soil-cement, clay gravel, sand-clay or any form of soil stabilization. It's known that the SEAMAN has many other applications valuable to the road builder's work so that even apart from mixing, the SEAMAN can be kept busy day in and day out. Now add to those reasons the fact that it is lower in cost and faster in production and you'll see why time-pressed contractors turn to the SEAMAN to decrease shut-downs and increase output during every working day.

And remember, the SEAMAN, used in conjunction with certain conventional mixing plants will as much as double the daily output.

SEAMAN MOTORS, INC.
MILWAUKEE 3, WISCONSIN

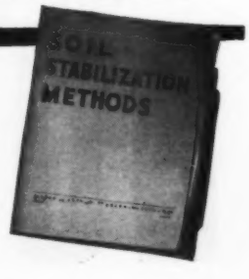
Auxiliary Spray Bar and Pumping Unit



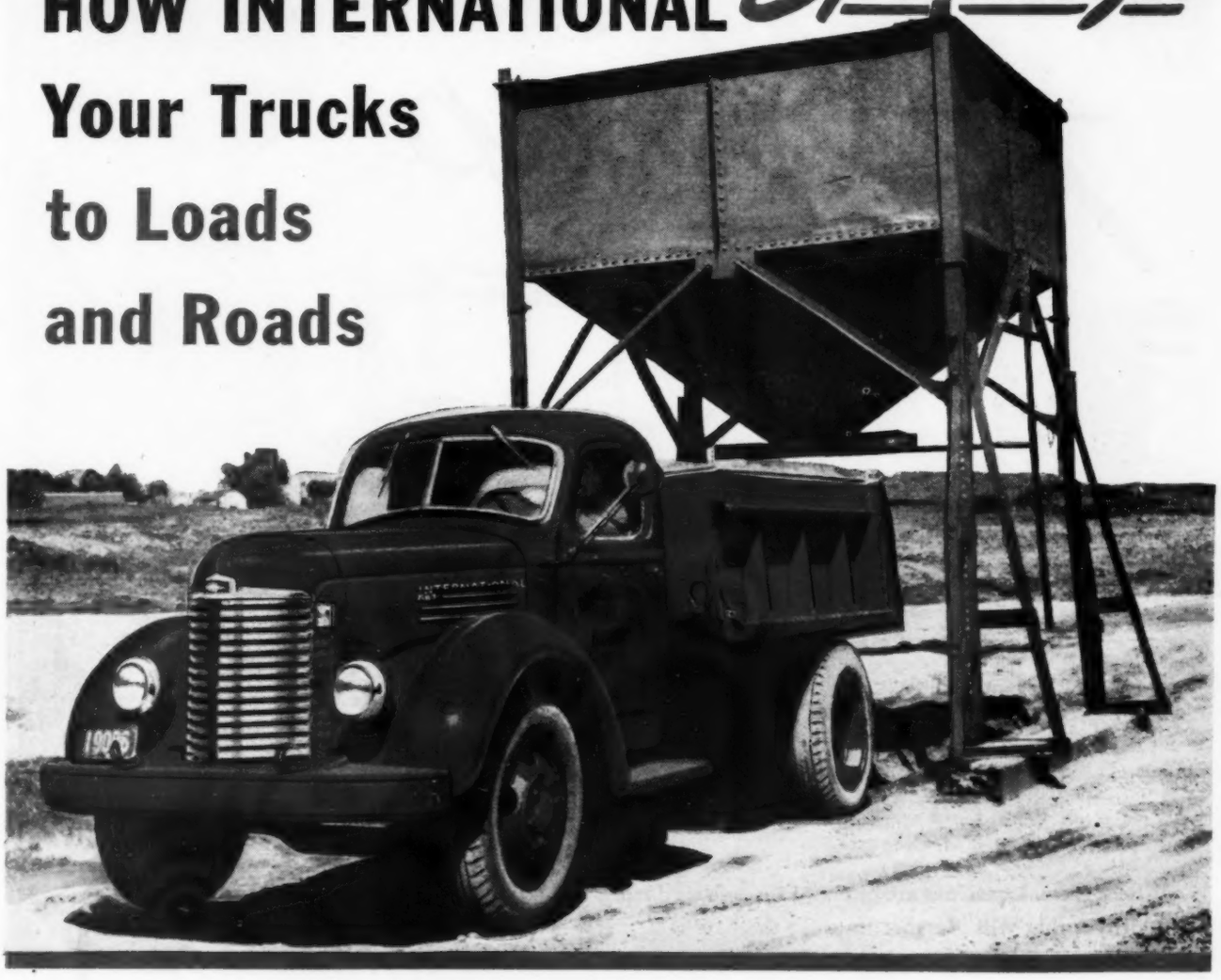
For Positive Control of Moisture. In soil cement, or any soil stabilization process and in earth work compaction, — control of the moisture increment must be positive to obtain optimum content efficiently. The SEAMAN SPRAY BAR and PUMPING UNIT, mounted on the MIXER chassis, introduces the water into the rotor chamber. Evaporation or migration losses of the water are eliminated. Further, only transfer trucks need be used for water transport. Saves equipment, saves labor, saves trips.

More Economical for Oil. Many of the same benefits of the SPRAY BAR and PUMP prevail in its use in oil application. With the oil introduced into the rotor chamber the binder is in process immediately and the mix is in positive control of the operator until completion.

Going as strong as ever, the famous booklet, "Soil Stabilization Methods", compiled by Seaman Engineers, is yours on request. Handy, practical, filled with job facts and modern procedures. Ask for Bulletin—RS-25.



HOW INTERNATIONAL *Specializes* Your Trucks to Loads and Roads



This first step is an analysis of your hauling problem by your International Dealer or Branch.

This analysis includes type of load; method of loading; terrain and grades; and length of hauls.

The amount of payload practicable for your trucks then is determined by the exclusive International Truck Point Rating System.

Your Internationals then are *specialized*—engine power, transmissions, axle ratios and other units and attachments—to fit your trucks to your jobs.

What does this *specialization* add up to?

1. Ability to do *your* hauling jobs right. 2. Dependability. 3. Economical operation. 4. Low maintenance. 5. Long truck life.

The International Truck Line is the most complete line built. It includes 22 basic models that *specialize* into more than 1,000 different types of trucks. Gross weight ratings are from 4,400 to 90,000 pounds.

For details of International Truck *specialization*, and analysis of your jobs by the International Point Rating System, consult your International Dealer or Branch.

Motor Truck Division
INTERNATIONAL HARVESTER COMPANY
180 North Michigan Avenue Chicago 1, Illinois

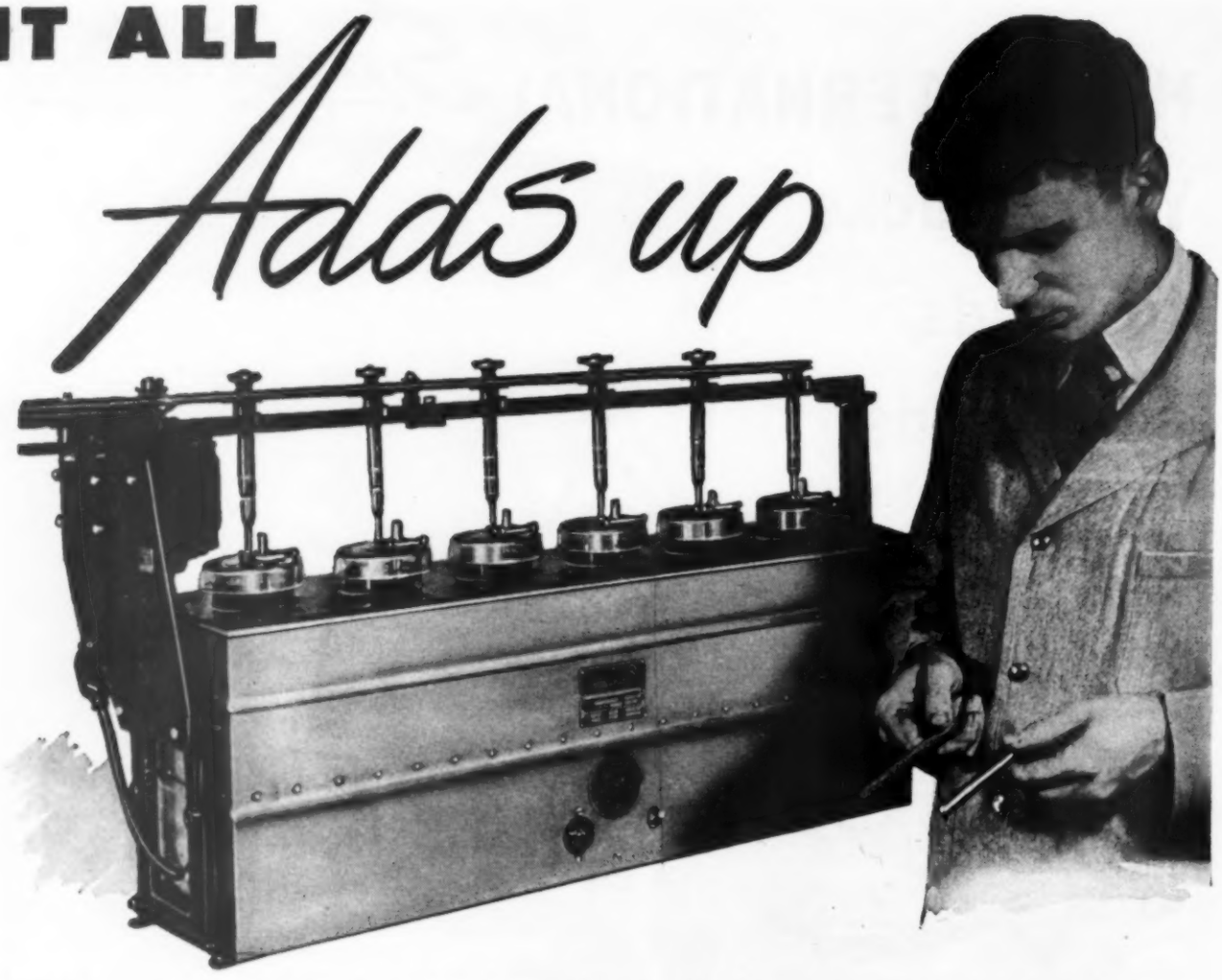
40TH ANNIVERSARY OF INTERNATIONAL TRUCKS
1907-1947—Forty years of International Truck Service to Industry, Commerce, Agriculture

INTERNATIONAL

Tune in James Melton on "Harvest of Stars" Sunday! NBC Network.

INTERNATIONAL *Trucks*

IT ALL *Adds up*



Where special qualities are essential for safe, enduring industrial lubrication, Sinclair Research develops additives that will "further improve the best".

Pictured above is one apparatus used by Sinclair Research to determine the rust-inhibiting efficiency of oils manufactured for turbine use. Chemical additives are studied to provide such protection against rust. Obviously, the treated oil sample used on the metal rod in the technician's left hand has high rust-inhibiting efficiency and prevented the deposit shown on the other rod.

All Sinclair Research and Refinery Control is similarly thorough. *It all adds up* . . . to assure you of lubricant qualities essential to efficient and economical industrial maintenance in all applications.

Sinclair Automotive Oils
For Bus, Truck and Tractor
OPALINE
TRUCK BUS TRACTOR
OIL
Superior lubrication in the long pull, under heavy loads
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Keeps engines clean . . .
Sustains top engine performance

SINCLAIR REFINING COMPANY • 630 FIFTH AVENUE, NEW YORK 20, N. Y.

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Lubricants for Industry

FINEST CRUDES + EXPERT RESEARCH and MANUFACTURING CONTROL = OUTSTANDING PERFORMANCE

Barber-Greene

for SPEED
MOBILITY
ALL-AROUND
COST REDUCTION

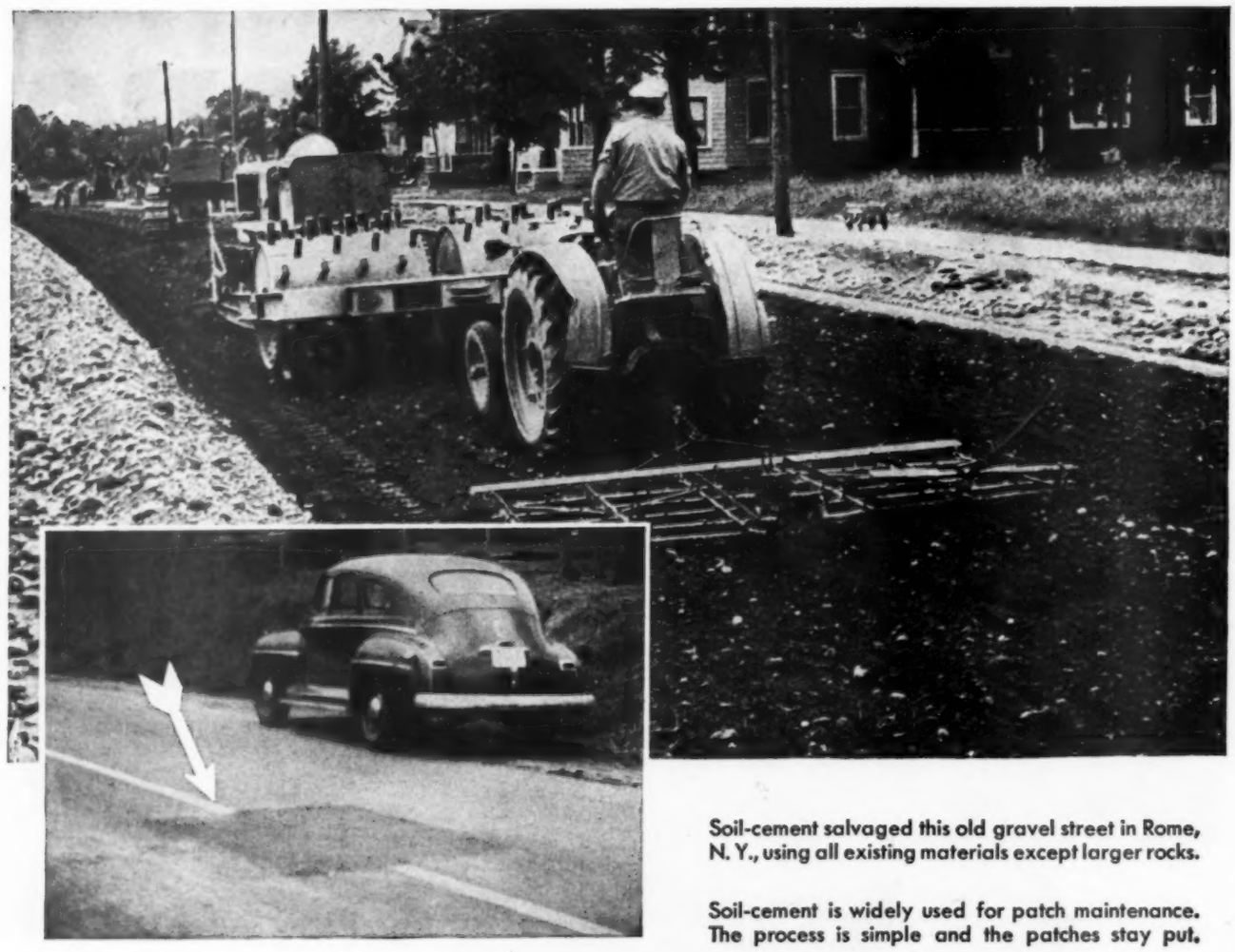
Wherever free-flowing bulk materials are handled, the new B-G 545 pneumatic-tired Bucket Loader is *right*. It's big and fast—loads at a high production pace. It's easy to put to work in just the right spot—turns in its own length, has the power and traction to crowd into the bank and has a high speed reverse for faster travel around the yard. Simple, centralized controls; electric starter; hard-lipped buckets; it's engineered throughout to meet up-to-the-minute demands.

The best is never easy to get. Naturally, there is a heavy demand for the 545. That's why we suggest that if you can look ahead to the time you, too, will need one—see your Barber-Greene distributor now. Barber-Greene Company, Aurora, Illinois.

BARBER-GREENE COMPANY • AURORA, ILLINOIS

Constant Flow Equipment

LOADERS | PERMANENT CONVEYORS | PORTABLE CONVEYORS | COAL MACHINES | BITUMINOUS PLANTS | FINISHERS | DITCHERS



Soil-cement salvaged this old gravel street in Rome, N. Y., using all existing materials except larger rocks.

Soil-cement is widely used for patch maintenance. The process is simple and the patches stay put.

Low-cost *SOIL-CEMENT*

puts new life in old roads and streets

SOIL-CEMENT is the modern way to ***rebuild*** light-traffic roads and streets. It transforms worn out gravel, stone and granular surfaces into strong, long-lasting, all-weather pavements.

Moreover, soil-cement is an effective way to ***patch*** for permanence, for soil-cement patches stay put. And soil-cement patching is so easy that you can catch up with and stay abreast of maintenance. Many state highway departments have adopted this efficient method of solving repair problems.

You can restore old pavements to new-pavement serviceability the soil-cement way with confidence. Since 1935, when it was first introduced, soil-cement has been used to pave more than 46 million square yards of roads, streets and airports in 41 states, the District of Columbia and Alaska.

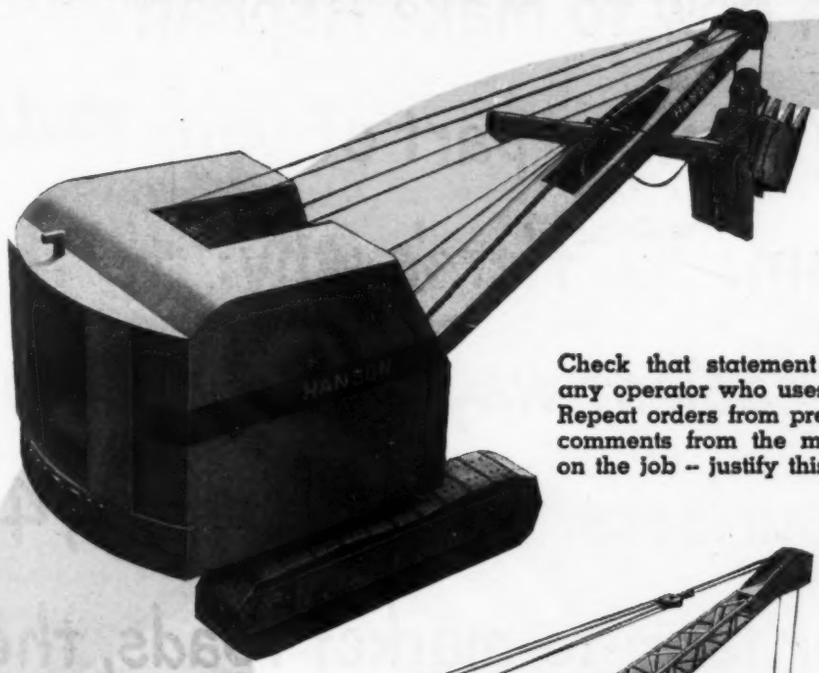
It's economical too. About 90 per cent of the required material is native soil on the site. Write for details on maintenance and reconstruction work with soil-cement. Distributed only in United States and Canada.

PORTLAND CEMENT ASSOCIATION

Dept. A10-28, 33 W. Grand Ave., Chicago 10, Ill.

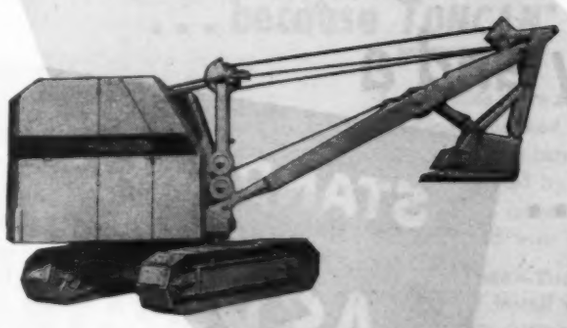
A national organization to improve and extend the uses of portland cement and concrete ; ; ;
through scientific research and engineering field work

YOU GET MORE WORK DONE.. with a HANSON



Check that statement against the record. Ask any operator who uses one of the new Hansons. Repeat orders from present users and unsolicited comments from the men who pull the levers -- on the job -- justify this claim.

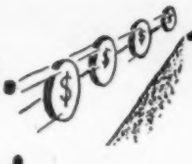
Two sizes: Model 31 - ¾ cu. yd. as shovel or 4½ tons as crane.
Model 41 - ½ cu. yd. as shovel or 6½ tons as crane.
Basic unit easily and quickly converted in the field to shovel, trench-hoe, crane, clamshell or drag-line.



FEATURES: Full revolving . . . chain crowd . . . fully enclosed steel cab . . . welded steel construction . . . ball or roller bearings at all vital points . . . air controlled steering . . . disc type clutches on swing . . . internal expansion, booster type clutches on hoist and crowd . . . all clutches easily and quickly relined without removing shaft assemblies . . . extra long crawlers . . . heavy duty industrial type motor . . . gasoline or diesel.

Write for detailed specifications, catalog RS-107.

HANSON CLUTCH AND MACHINERY COMPANY TIFFIN, OHIO

Plan now to make Asphalt resurfacing a major part of your 1948 road program. Here's why: it's the fastest and easiest way to rebuild worn and broken surfaces. For city streets, 4-lane highways, or farm-to-market roads, there are economical types of Asphalt construction that will give you the most miles of smooth-riding, easily maintained roads for your highway dollars.  To get unvarying top quality and a reliable supply use...

STANDARD OIL ASPHALT

Our Asphalt Representatives are located throughout the Midwest to help you on any phase of your Asphalt work—from planning to delivery. Standard Oil Company (Indiana), 910 South Michigan Avenue, Chicago 80, Illinois.

STANDARD OIL COMPANY (INDIANA) STANDARD SERVICE

TONCAN IRON

makes culverts last longer

. . . because *TONCAN** Iron Corrugated Metal Pipe . . .

1. Contains twice as much copper as copper-bearing steel or iron—*plus* molybdenum.
2. Resists rust and corrosion caused by water, soil or sewage.
3. Is strong to carry heavy loads—flexible to prevent cracking or crumbling.
4. Is unaffected by vibration, impact, severe weather changes, earth settlement, etc.
5. Does not come apart at joints—maintains perfect alignment.
6. Is riveted with Toncan Iron rivets to insure longer life.

FURTHERMORE—Toncan Iron Corrugated Metal Pipe is light in weight, and easy to handle and install with unskilled labor. It means lowest possible installation and maintenance costs—results in lowest cost per year of service.

TONCAN CULVERT MANUFACTURERS' ASSOCIATION • CLEVELAND 14, OHIO

Toncan Iron—A Product of Republic Steel Corporation—is available in:

CORRUGATED METAL PIPE • PERFORATED CORRUGATED METAL PIPE • CORRUGATED METAL PIPE-ARCH • CORWEL SUBDRAINAGE PIPE
SECTIONAL PLATE PIPE • SECTIONAL PLATE ARCHES • SECTIONAL PLATE PIPE-ARCH • BITUMINOUS COATED AND PAVED PIPE

*Toncan is a registered trade mark of Republic Steel Corporation

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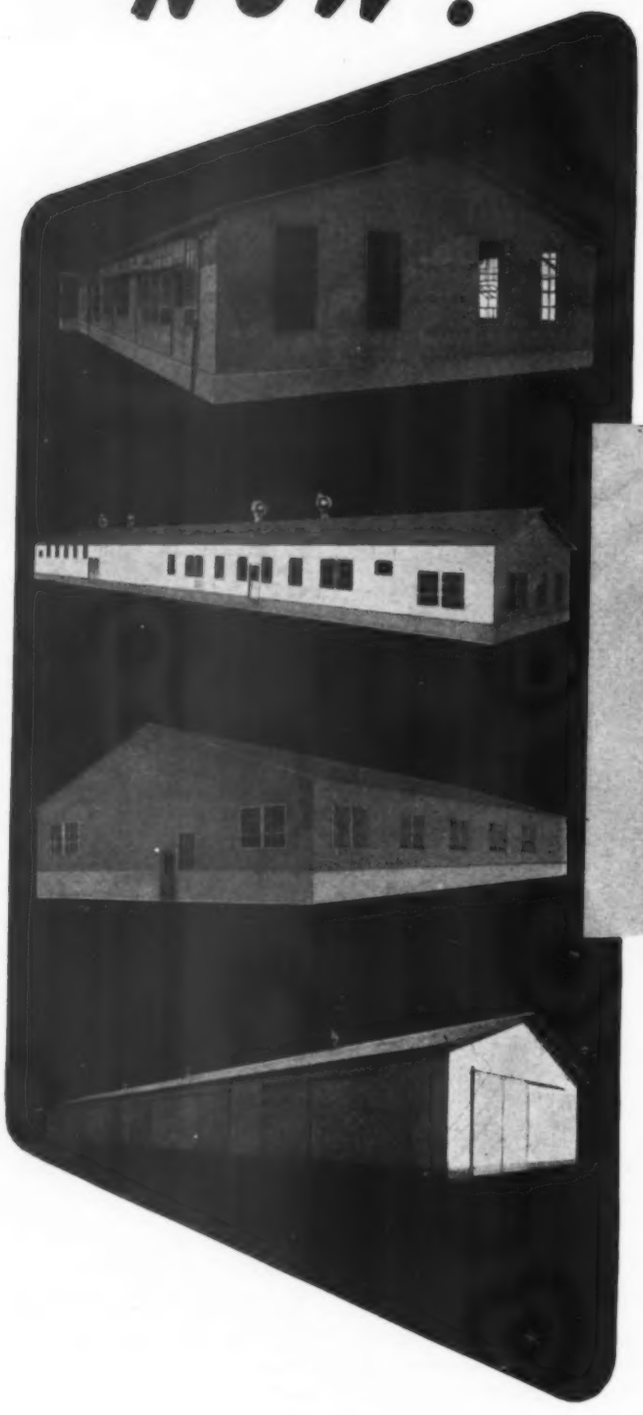
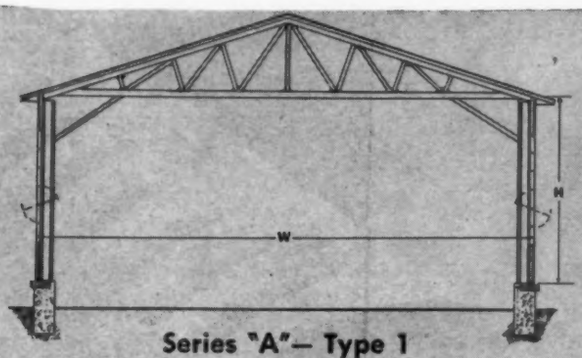
Prompt Delivery of TRUSCON STEEL BUILDINGS



In sizes not exceeding 30′-0″ in width, 16′-1¼″ in height and lengths in multiples of 4′-0″.



Series "A"— Type 1

Standard Heights of Sidewalls	Standard Widths of Buildings
H	W
8′-1¼″, 10′-9¼″, 13′-5¼″, 16′-1¼″	8′-0″, 12′-0″, 16′-0″, 20′-0″ 24′-0″, 28′-0″, 30′-0″

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● Meet today's needs for more enclosures by building or enlarging with Truscon Standardized Steel Buildings. Standard designs, prefabricated, highly versatile and adaptable. Features include fire protection, permanence, ease and speed of erection, low upkeep, quick dismantling and re-erection, low cost and high investment value. Buildings are available with either interlocking painted steel or 18 gauge 1½ inch Ferrobord roof with insulation and waterproofing. Truscon engineers will give you experienced planning help for any need—write now!

TRUSCON STEEL COMPANY
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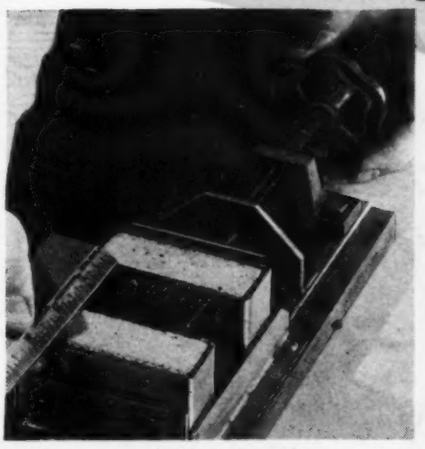
YOUNGSTOWN 1, OHIO • Subsidiary of Republic Steel Corporation

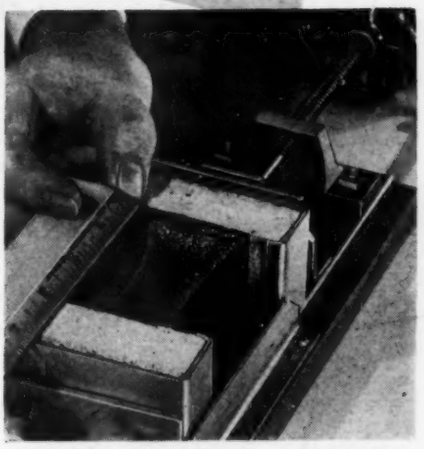
Manufacturers of a Complete Line of Welded Steel Fabric . . . Concrete Bars . . . Contraction Joints . . . Dowel Assembly Units . . . Curb Bars . . . Complete Steel Buildings.

We S-T-R-E-T-C-H-E-D a point...

Flintseal is poured between cement mortar blocks for testing.



Blocks are extended ⅛ inch per hour.



Extended double to 3 inches, Flintseal maintains perfect bond.

...to PROVE one!

• They keep getting bigger! The Consolidated-Vultee B-36 can carry an atom bomb anywhere in the world and return. Sky giants like this must have concrete runways. Flintseal Joint-Sealing Compound increases service life and reduces maintenance cost for concrete paving.

• With more traffic than ever before on our highways, maintenance becomes even more important. Flintseal helps cut maintenance to the bone, because its bond remains firm and tight through repeated cycles of expansion and contraction.

It happened like this.

We were demonstrating the extensibility of Flintseal* Joint-sealing Compound as required by Federal Specification SS-F-336a . . . (5 cycles of extension from 1 to 1½ inches at 0° F. and recompression at room temperature).

Then, showing what Flintseal would really do, we extended to 3 inches. Three times its original width instead of half again as wide.

And the bond of Flintseal to the test blocks remained as firm as ever!

We admit that's stretching a point. Joint-sealing Compound probably would never be called on to perform like that. But isn't it a comfort to know that materials you use have that *additional* factor of adhesion and safety?

You get that and more with Flintseal. It's a *rubber-bearing, thermoplastic* joint-sealing compound especially developed by Flintkote to give you four important advantages:

1. Seals joints effectively against infiltration of moisture and other foreign matter through repeated cycles of expansion and contraction of concrete slabs.

2. Adheres firmly to concrete . . . without use of primers. Remains extensible and compressible.

3. Maintains resilience . . . does not become brittle and crack in coldest weather, nor will it flow in hottest weather.

4. Can be melted and applied quickly and easily in equipment especially designed to permit safe, economical handling.

For full details and application data on Flintseal, write today.

*Trademark

THE FLINTKOTE COMPANY, 30 Rockefeller Plaza, New York 20, New York

ATLANTA • BOSTON • CHICAGO HEIGHTS • DETROIT • LOS ANGELES
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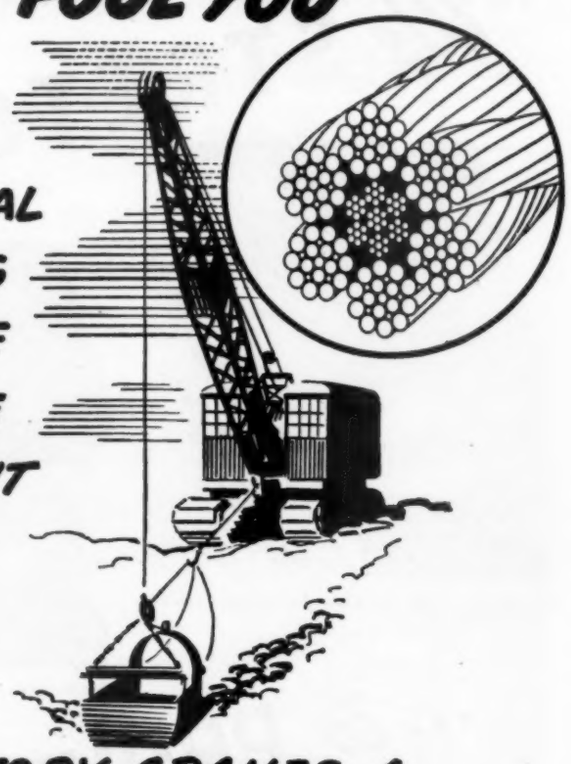
Flintseal

FLINTKOTE INDUSTRIAL PRODUCTS

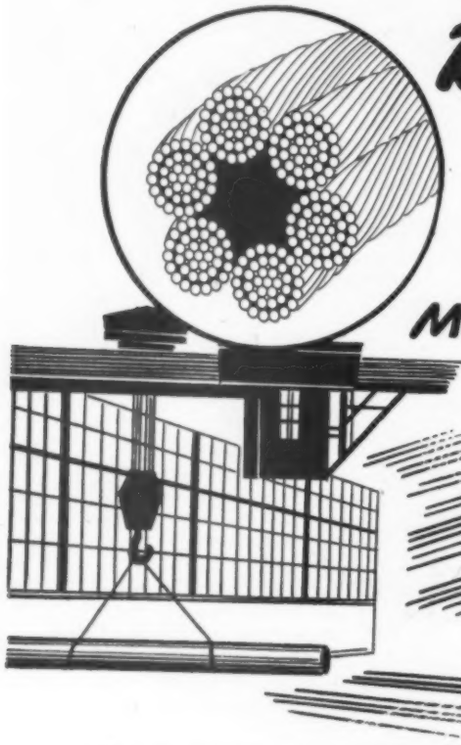
HOT-POURED JOINT-SEALING COMPOUND

SOME ROPES FOOL YOU



U-W 6×16 FILLER WIRE IS IDEAL FOR DRAG CABLES ON DRAG LINE EXCAVATORS BECAUSE IT IS SUFFICIENTLY FLEXIBLE AND ABRASION RESISTANT

BUT...



FOR FACTORY CRANES A MORE FLEXIBLE ROPE IS BETTER WE RECOMMEND U-W 6×37 CONSTRUCTION FOR THIS PURPOSE

For longest and best service, always specify
U-W LAYRITE (*Preformed*) IMPROVED PLOW STEEL

We invite you to let UPSON-WALTON engineer your tough rope jobs.

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THE UPSON-WALTON COMPANY

Manufacturers of Wire Rope, Wire Rope Fittings, Tackle Blocks, Brattice Cloth

Main Offices and Factory: Cleveland 13, Ohio

114 Broad Street, New York 4 — 737 W. Van Buren Street, Chicago 7 — 241 Oliver Building, Pittsburgh 22

ANOTHER GREAT LEADER IN A GREAT LINE

FWD's FAMOUS MODEL "SU" WINS

$81,000,000.00 ENDORSEMENT

America's Foremost Heavy-Duty Truck

When a single model of a heavy-duty truck is purchased in volume reaching a total dollar value of $81,000,000.00 in less than six years, it rightfully gains leadership in its field. FWD's Model SU has won this extraordinary recognition and endorsement of motor truck buyers.

In every sense, the FWD Model SU is a great leader in a great line of trucks. It represents the most advanced development of the FWD four-wheel-drive principle pioneered by FWD in 1910, and recognized all over the world for outstanding heavy-duty performance.

FWD safety and surety — the dependable pulling power and traction of four driving wheels — the ability to do more work at low-cost-per-ton-mile, and to move capacity loads to location, on or off the highway—these FWD four-wheel-drive advantages are vital in heavy-duty trucking operations.

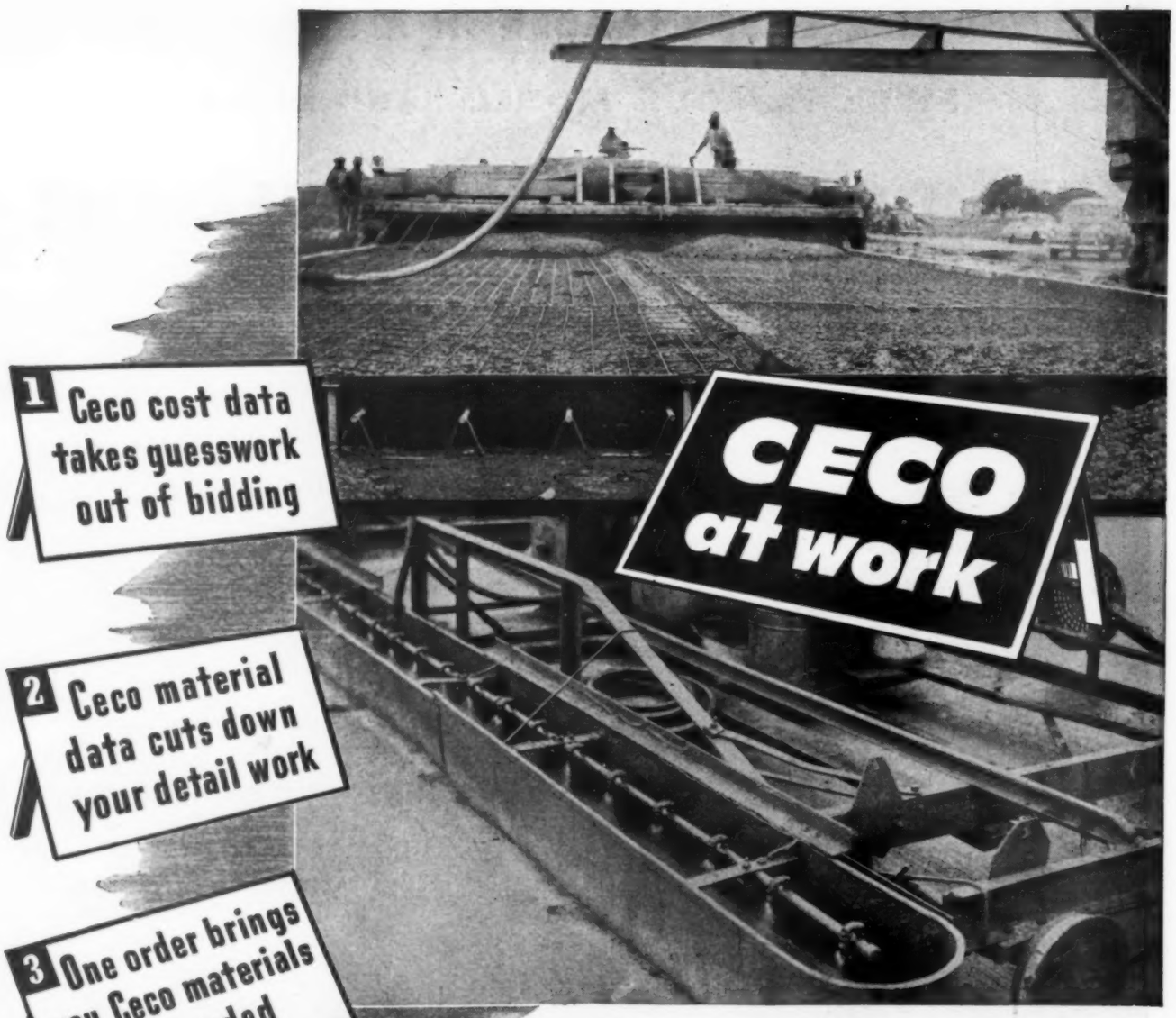
Wherever motor truck performance must be more than usually dependable—in highway or municipal service, in utility line construction and maintenance, in oil-field operations, in heavy hauling on or off the highway — FWD four-wheel-drive trucks render valuable service.

See the nearest FWD distributor for complete information.

THE FOUR WHEEL DRIVE AUTO CO., Clintonville, Wisconsin

Canadian Factory: Kitchener, Ontario

WORLD-WIDE SALES and SERVICE


1 Ceco cost data takes guesswork out of bidding
2 Ceco material data cuts down your detail work
3 One order brings you Ceco materials as needed
CECO at work

a 3 Point Program for Surer Road Building Profits

CECO offers you more than precision road building materials. It offers you a 3-point program for surer profits based on construction knowledge gained from years of practical experience. Call any one of 23 offices located coast to coast, for engineering skill and fine road building materials . . . plus a plan for road building profits. Remember Ceco's 3-point program takes the guesswork out of bidding, cuts down your detail work and one order brings you materials where you need them, when you need them.

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TYPICAL CECO HIGHWAY PRODUCTS • Welded Wire Fabric • Metal Center Strips
Cecure Curing Compound • Reinforcing Steel • Load Transfer Devices • Joint Sealing Compound
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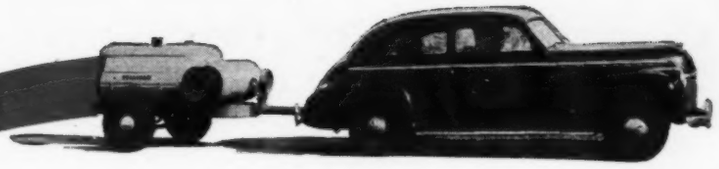

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THE NEW
SULLIVAN
SERIES 80
PORTABLE AIR COMPRESSORS
ALWAYS DEPENDABLE

★ 2 STAGE COMPRESSION
★ MORE COMPACT DESIGN
★ Automatic "ECONO-MISER" LOAD CONTROL

W&D C501

Consult a Joy Engineer

Write for Bulletin

SULLIVAN

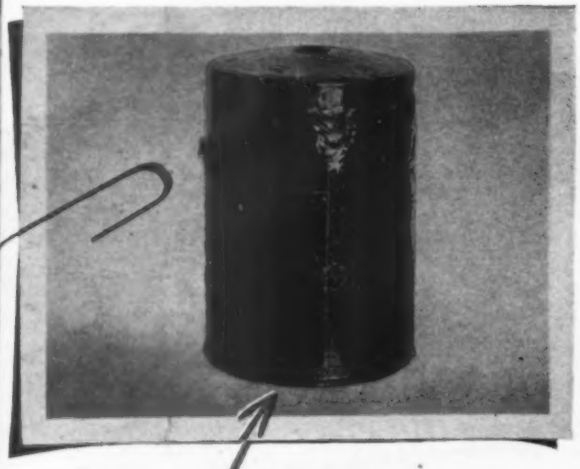
"The World's Most Modern Portable Compressed Air Plant"

PORTABLE AIR COMPRESSORS FROM 60 TO 630 CFM

SULLIVAN DIVISION
JOY MANUFACTURING COMPANY

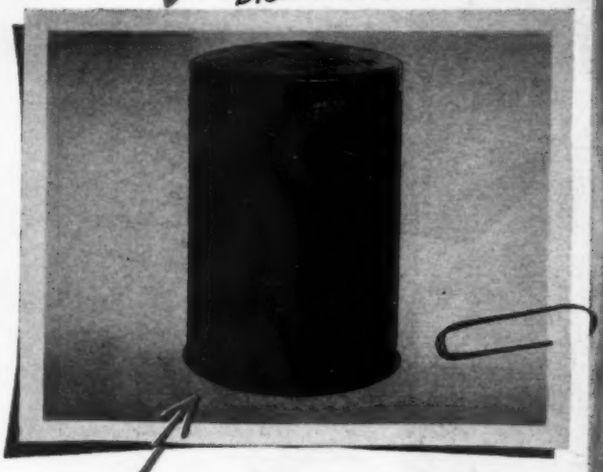
LUBE MEMO

How Joe stopped Filter Clogging



Joe says filters have gummed up like this after about 600 hours on oil he's been using

Joe says nothing but RPM Delo Oil in his Diesels from now on



Here's how the filter looked after 600 hours on RPM Delo Diesel Engine Lubricating Oil

Joe finds RPM Delo Oil keeps filters clean because:

1. It's compounded to resist oxidation and minimize sludge.
2. Its "detergent" cuts down sludge.
3. It remains stable in the presence of moisture.

DIESEL ENGINE RPM DELO LUBRICATING OIL

Set up trial on RPM Delo Oil Today!

STANDARD OIL COMPANY OF CALIFORNIA • San Francisco, Calif. • STANDARD OIL COMPANY OF TEXAS • El Paso, Texas
THE CALIFORNIA OIL COMPANY • Denver, Colo. • THE CALIFORNIA OIL COMPANY • New York

POWER and SPEED
to Deliver the Load

Under all Road and
Traffic Conditions

EATON
2-SPEED
Truck
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EATON MANUFACTURING COMPANY
Axle Division
CLEVELAND, OHIO

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Those short hauls on a dirt-moving or fill job used to be a real headache for us. But not any more since our Oliver "Cletrac" dealer showed us how we could "short cut" them.

We were talking the situation over one day when he came up with this. "Look," he said, "on those short hauls you can save a lot of time by equipping your Cletracs with Drott Bull Clam Shovels. You see, these units can act as a bulldozer and scraper combined . . . at a lot lower operating cost and in a lot less time. They scrape up the dirt, carry it in the bowl direct to the dumping point. They travel straight ahead with no time out to change position for loading or unloading. There's no loss of material en route and the unit levels the surface ahead of the tractor when it loads and when it's traveling. The operator can regulate the depth of cut from his seat. This unit doesn't dig a hole to fill a hole. The blade can be tilted horizontally to either side to get a straight cut, even on uneven ground."

Let me tell you they really short-cut our short hauls. The Oliver "Cletrac" dealer sure is a big help to us. He's a good man to know!

Cletrac

a product of

The OLIVER Corporation

Industrial Division: 19300 Euclid Avenue, Cleveland 17, Ohio

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MORE IN DEMAND THAN EVER BEFORE

● Cost-minded and time-crowded men everywhere are calling for more and more Barco Portable Gasoline Hammers. These rugged, self-contained machines have proved over and over their ability to do *more* work, *better* work, in *less* time.

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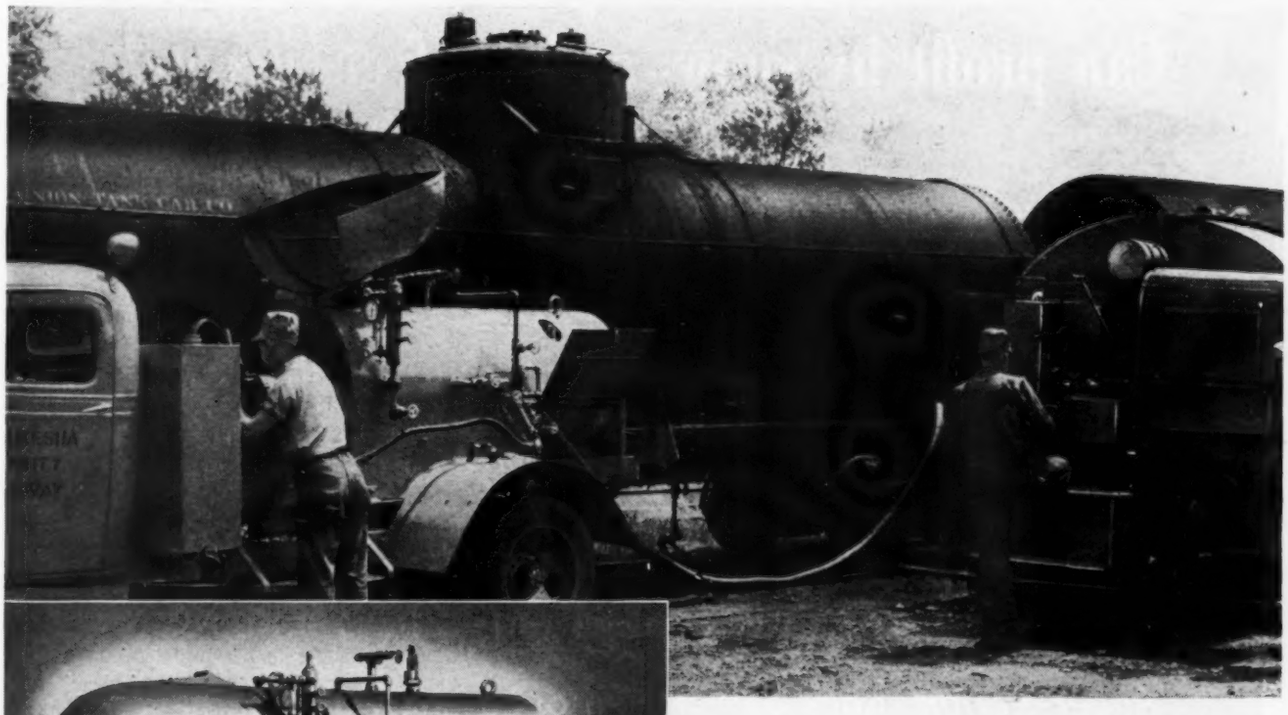
"Johnny-on-the-SPOT" when you've got to pour it HOT!



Mobile tank-car heater available in two and three tank car heating capacities. Oil-fired with extra high heat transfer flue-travel; dry coil steam condensate return under pressure — no water or heat losses.

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THE tank car on the siding is the starting point for fast work on any project requiring the heating and handling of bituminous materials. The quicker the material is heated to application temperature and flowing into the distributors — the faster your road crews can get going.

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5106 NORTH 33rd STREET • MILWAUKEE 9, WISCONSIN

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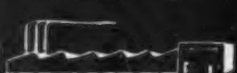
PIONEERS AND ORIGINATORS OF

TANK CAR HEATERS... BITUMINOUS BOOSTERS... AUTOMATIC STEAM PLANTS

Your City, Too,

Can profit by snow-and ice-free streets!

Icy pavements and snow-filled streets hamper business, cause accidents to pedestrians and vehicles, endanger lives of school children. Continuous storms create fuel shortages, cut vital public services. Yet many cities now enjoy snow-and ice-free streets thanks to STERLING *"Auger-Action"* Rock Salt. It removes snow and ice, saves lives and property... keeps business and industry humming  and time, labor and money are saved with clean quick-acting STERLING Rock Salt. *ORDER NOW!* In carloads - bulk or 100 lb. bags. A trained representative will gladly call. *Write Today!*

International Salt Company, Inc. Scranton, Pa.

STERLING
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UNDER CONTROL

. . . of BLACKHAWK *Hydraulics!*

THE MEN who build plows and the men who use 'em — know the ease, speed and accuracy with which Blackhawk Hydraulic Controls lift and lower the blades. That's why nine out of ten snow plow manufacturers build with Blackhawk as standard equipment. When drifts are high and the going is tough, road men appreciate the dependable performance and extra security they get from Blackhawk Hydraulic Systems operated from the comfort of a warm cab. You'll be ordering known performance and satisfaction when you specify Blackhawk Hydraulics on *all* your road equipment. For complete information on the advantages of Blackhawk Hydraulics, write to your equipment manufacturer.

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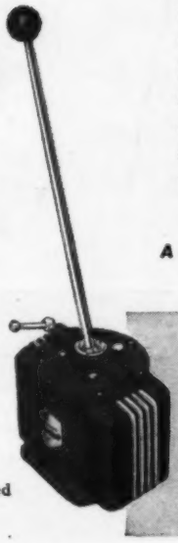
Blackhawk Hydraulic Controls are engineered and priced for *quantity* purchase and *practical* installation on your products for even greater customer satisfaction. Submit your hydraulic problems to us. We will work with you in confidence.

A Product of **BLACKHAWK MFG. CO.,** Dept. R5, **Milwaukee 1, Wisconsin**



***POWER-DRIVEN** P-104 Power-Packer Pump —belt or gear driven —control valve is operated from cab. Compact, easily installed.

***HAND OPERATED** P-60 Power-Packer Pump —mounts in cab. Blackhawk is also the source for RAMS and VALVES for use with these pumps.

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DOLLAR for DOLLAR

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3/4-SWING BADGER

MOVES MORE MATERIAL . . .
FASTER AND CHEAPER

Check these BADGER FEATURES

- √ Lighter Swinging Weight
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- √ Easily Portable
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AND ASK YOUR NEARBY A-W DEALER to tell you the whole story of how the versatile BADGER will save time and make money for you.

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AURORA, ILLINOIS, U. S. A.

BUILDERS OF ROAD MACHINERY

Austin Western

SINCE 1859

PERFORMANCE!

Tells more than Words

"HANDY" PUMP

For size of pump, for power consumed, for dollar invested, Gorman-Rupp pumps will out-perform any other pump. This is a "put up or shut up" proposition for we are willing to let you prove this for yourself by a free trial with no strings attached.

There is a Gorman-Rupp pump to fit any job. If you want a handy all purpose pump as easy to carry as a bag of tools, the tiny "Handy" pump will fill the bill – weighs only 20 pounds. Fitted with pipe or common garden hose this pump will lift up to 25 ft. Delivers 8 GPM at 40 lbs. pressure and more at lower pressures depending on water lift. Electric motor driven. Completely self-priming.

For a heavy dewatering job that calls for as much as 125,000 GPH, use a husky Gorman-Rupp heavy duty model pump.

Gorman-Rupp self-priming centrifugal pumps never have to be shut down to be cleaned out – no recirculation orifice to get plugged – no control valve to get jammed.

Ask what you want of a sturdy Gorman-Rupp pump – give it any kind of a test. Actual performance on the job will convince you.

For details call your nearest distributor.

THE GORMAN-RUPP COMPANY

Gorman-Rupp Pumps – Unsurpassed for Pumping Fast

323 N. Bowman St. **Mansfield, Ohio**

LION Naturalube D.H.D. OIL

RESISTS SLUDGING • REMOVES CARBON

More Power — Lower Operating Cost

Naturalube D. H. D. Oil is refined from a basically different crude oil that has amazing natural properties. Because of them, D. H. D. is able to loosen and remove hard carbon *naturally*. It has greater natural ability to penetrate to all parts of an engine. It has greater natural ability to *cling* to those parts. You get the constant wear-saving protection of a naturally tougher oil film. And D. H. D. is non-corrosive — safe!

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D. H. D. gives you these big advantages in road building and heavy construction operations: less wear, fewer repairs, more power from a cleaner engine, and lower operating and maintenance costs. Leading engine manufacturers accept Naturalube D. H. D. as a superior lubricant.

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For complete information, ask your Naturalube Distributor or write direct to Lion Oil Company, El Dorado, Ark.

The Naturalube Guarantee —

If you don't believe Naturalube D. H. D. is the best oil you have ever used, Lion Oil Company will give you your money back.

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...Bucket selection made EASY!

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Hundreds of buckets to pick from—your job, your equipment, and your conditions can be exactly met—and you will get a bucket which really performs.

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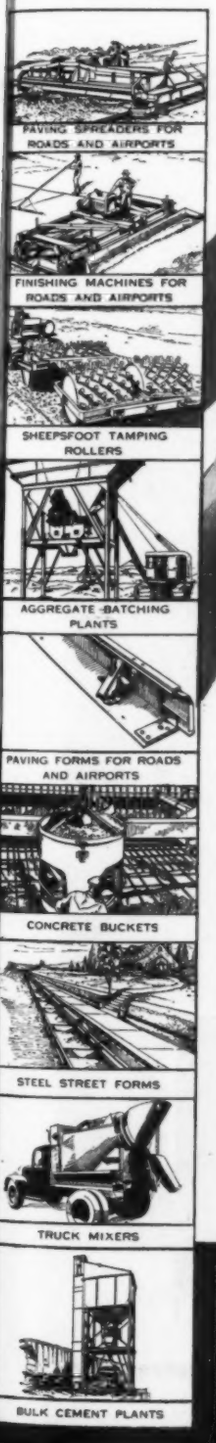

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Just check your:

- **Crane Capacity** ✔
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BLAW-KNOX CONSTRUCTION EQUIPMENT

FOR DEPENDABLE, LOW-COST HAULING...

get a "Job-Rated" truck like this

Are YOUR hauling costs too high? Are your trucks "gas-eaters"—or in the repair shop too often?

If so—perhaps it's time for new equipment . . . better equipment that *fits* your job.

It stands to reason that a *"Job-Rated"* truck that FITS your loads and your operating conditions—will give better performance, enable you to give better service to your customers, and operate at lower cost.

Such a truck will have *"Job-Rated"* power—the right one of 7 great Dodge truck engines for power *plus* economy. It will have exactly the right clutch, transmission, rear axle—the right units throughout—for longer-lasting, more dependable service.

To make sure that your next truck is *"Job-Rated"* to handle your loads over your roads—simply explain your hauling requirements to your Dodge dealer . . . and he will select the right Dodge *"Job-Rated"* truck for *your* job.

★ ★ ★

Your Dodge dealer is interested in your continued satisfaction: *First*, by selling you a truck that fits your job; *Second*, by giving you dependable Dodge truck service; *Third*, by providing you with truck parts that are identical with original Dodge *"Job-Rated"* truck parts.

ILLUSTRATED: MODEL WH, 2-TON.

DODGE

ONLY DODGE BUILDS *"Job-Rated"* TRUCKS

Fit the Job . . . Last Longer !

"No major repairs!"

Outstanding production records are an old story to Bucyrus-Erie excavators, which have consistently piled up long hours of operation with low maintenance costs. Take this Bucyrus-Erie 30-B dragline, for instance. Here is part of a letter received from Mr. J. G. MacLachlan, manager of the Hudson Bay Railway, Manitoba, Canada:

"The machine has been in continual seasonal operation since September, 1926 . . . has excavated 100 miles of side and off-take ditches, largely in permanently frozen ground, and other excavations to a total of approximately 1,000,000 cubic yards. We have had to make no major repairs."

There is no magic formula for the long life of Bucyrus-Eries. Durable parts in an efficient basic design; easily-made, long-lasting adjustments; simple, effective lubrication — all these play an important part in keeping Bucyrus-Eries on the job year in, year out, with a minimum of "time out" for repairs and with consistently economical operation.

Your Bucyrus-Erie distributor can show you why today's Bucyrus-Erie ⅜ to 2½-cu. yd. excavators can be depended upon for long service and still be "easy on the upkeep." Let him give you more information.

BUCYRUS-ERIE CO.
SOUTH MILWAUKEE, WISCONSIN

99E47

Doing the work of 80 men . . . *faster*

One Haiss snow loader does the work of 80 men, and handles up to 15 cubic yards a minute.

Loading high-sided trucks by hand is back-breaking, slow, expensive. But with a Haiss snow loader it's a modern mechanized operation, faster, cheaper, and more dependable.

This machine gets an amazing amount of work done because it is a positive digger and conveyor, operating on the continuous principle. Many communities run their machines all day and all night.

It's a glutton for light snow. And it's the best loader for hard and frozen snow because it is the only machine that digs upward as it loads. This is the loader you can depend on when the going is tough.

Our nearest sales representative will gladly arrange for you to see one in action.

Haiss is now a wholly-owned subsidiary of Pettibone Mulliken Corporation of Chicago. With new management and much larger resources, Haiss can now do a still better job for its customers . . . better machines and servicing, larger production, quicker deliveries.

Haiss specializes in equipment to load bulk materials . . . sand, gravel, stone, coal, topsoil, snow, etc.

Its machines are money-makers for their owners.

George Haiss Manufacturing Co.

381 Canal Place
New York 51, N. Y.

Now

WORLD'S LARGEST MOST POWERFUL TRACTOR

Allis-Chalmers HD-19

It's Rugged and Tough — Built to Outproduce and Outlast!

COMPLETELY NEW... with HYDRAULIC TORQUE CONVERTER DRIVE

BUILT TO GET MORE WORK DONE

- Weight: 40,000 pounds.
- Power: 2-Cycle General Motors Diesel — 163 hp. at flywheel.
- Torque converter automatically balances load and speed without gear-shifting.
- Speeds: 0 to 3.0 in low gear and 0 to 7.0 in high; reverse, 0 to 5.5.
- More traction, more ground contact, better balance.

BUILT TO LAST LONGER WITH LESS UPKEEP

- Torque converter smooths tractor performance—cushions engine and transmission from shock loads.
- Simplified maintenance — major assemblies conveniently serviced or removed. Operating adjustments easily reached, quickly made.
- Reduced lubrication — greasing intervals lengthened throughout . . . 1,000 hours on truck wheels, support rollers, front idlers.
- High clearance—over 16 inches.

BUILT FOR EASIER CONTROL — GREATER OPERATOR COMFORT

- Torque converter eliminates most shifting.
- Hydraulic, finger-tip steering.
- Convenient controls.
- Self-energizing brakes.
- New type, adjustable split seat.
- Wide arm rests.
- Adjustable brake pedals.
- Full visibility.
- Comfortable foot rests.
- Clean platform.

ALLIS-CHALMERS ... Originator of the Torque Converter Tractor

TRACTOR DIVISION — MILWAUKEE 1, U. S. A.

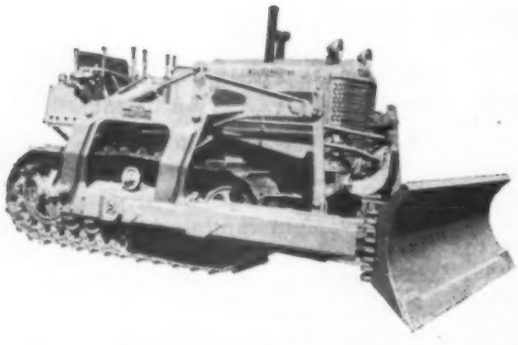
Uncover larger earthmoving *Profits*

. . . roll back the dirt quickly with Heil Hydraulic Bulldozers

The dirt really rolls back when you use a Heil Hydraulic Bulldozer. Yardages are bigger — costs lower. The secret of this unequalled rolling action lies in the design of the Heil Bulldozer blade. The scientific contour of this blade, developed after many years of earthmoving experience, provides a cleaner cutting action and a bigger load-carrying capacity without increasing size or weight. The cutting edges, made of special wear-resistant steel, are reversible. The additional life gained is just another of many Heil cost-cutting features. Here are a few more that save you time and money on any job:

The easy-handling, trouble-free Heil hydraulic unit provides quick finger-tip control. The positive action enables the operator to place the blade exactly where he wants it — he can dig faster and move more dirt. The all-welded, box-section construction, the sturdy connections, and the proper distribution of loads and stresses keep your tractors on the job longer — making bigger profits for you. Install a Heil Hydraulic Bulldozer on your Oliver-Cletrac as soon as possible. It's an easy, quick mounting job. See your Oliver-Cletrac distributor.

R-92

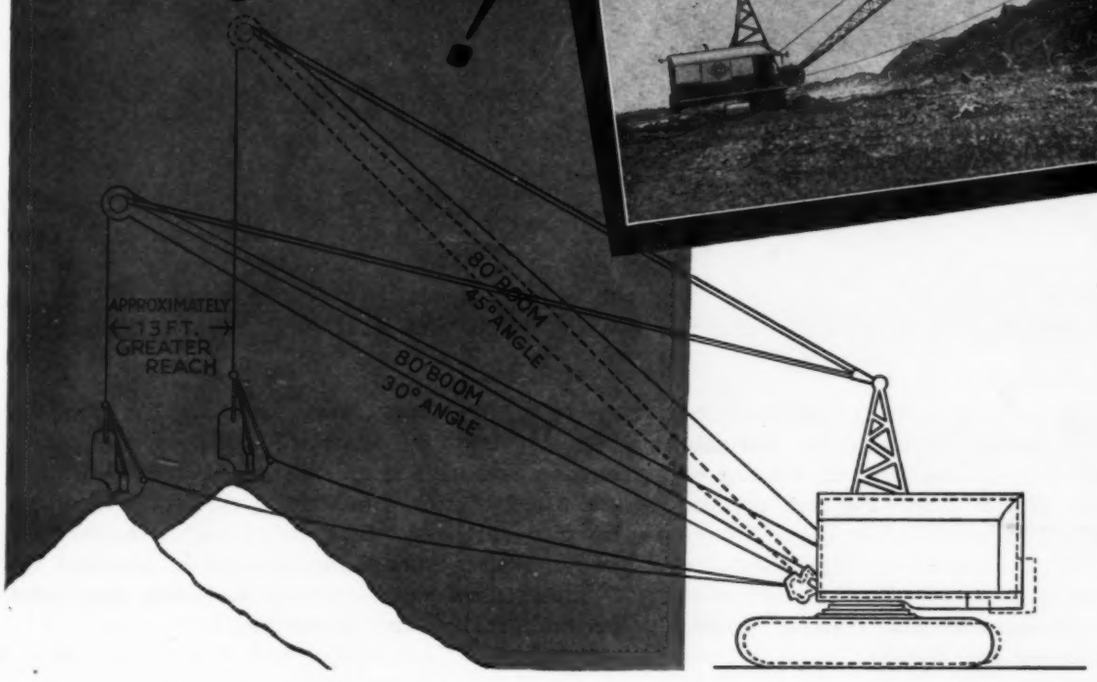


Heil Trailbuilder blades have the same scientific contour as Heil bulldozers. One man can change the blade angle in less than 5 minutes. The end tilt adjustment also can be made quickly and easily — there are no bolts, nuts, or wedges to handle.

THE HEIL CO.

GENERAL OFFICES • MILWAUKEE 1, WISCONSIN

It's the ANGLE OF THE BOOM THAT Counts!



Most dragline work requires the spoil be cast as far back from the cut as possible. Long Booms for such a purpose mean only extra weight if the dragline isn't capable of handling a long boom and load at a low angle. Working range does not depend so much on the length of the boom as it does on the angle at which the boom can be worked without tipping the machine. The accompanying sketch illustrates a comparison in working radii of a well balanced LIMA dragline equipped with an 80 foot boom and a 3 cubic yard bucket, working at 30 degree angle and a light weight machine equipped with the same length boom and bucket capacity, but which must be worked at 45 degree angle to avoid tipping. LIMA draglines are designed and built for dragline work. Low center of gravity, proper balance, long wide crawlers and big drums, all important advantages for successful dragline operation. Get the facts when you buy your next dragline.

LIMA LOCOMOTIVE WORKS, INCORPORATED
Shovel and Crane Division . . . LIMA, OHIO
OFFICES IN PRINCIPAL CITIES

LIMA

THE LIMA DIAMOND
FOR OVER 75 YEARS AN
• • EMBLEM OF QUALITY WORKMANSHIP • •

LIMA

Capacities . . . SHOVELS ¾ YARD TO 5½ YARDS • CRANES 13 TONS TO 100 TONS • DRAGLINES VARIABLE

What makes the WALTER such an outstanding SNOW FIGHTER?

1. TRACTION — the most vital requirement to enable a truck to navigate snow, ice and slippery surfaces, without stalling or side-slipping. Only Walter Snow Fighters provide 100% traction at all times—because only Walters have the patented automatic lock differentials to concentrate power on the wheels having traction at all times. This provides steady tractive power, prevents wheel-spinning and stalling.

2. POWER This means more than horsepower—it means tractive power or driving force. Walter Snow Fighters not only have powerful motors (150-350 hp.) but every horsepower is utilized by the exclusive Walter 4-Point Positive Drive. You can mount the biggest plows—tackle the biggest drifts.

3. SPEED Not merely rated highway speed—but sustained speed while operating in snow and ice and on slippery surfaces, clearing 2 and 3 feet of snow and blasting through deep drifts. Because of the combination of high traction and power, Walter Snow Fighters travel at speeds of 20-30 mph., throw snow far off the road, clear more miles per hour, make widening easier.

4. SPECIAL DESIGN Not only the Walter drive system — but the entire unit is scientifically designed and ruggedly built for snow removal. This includes its plows, controls, hydraulic equipment, cab, lights and every detail that provides efficient clearing and easy, safe handling.

FOR MORE DETAILS — see your nearest Walter distributor or write us for illustrated literature.

WALTER MOTOR TRUCK COMPANY
1001 Irving Ave., Ridgewood 27, Queens, L. I., N. Y.

THERE'S PROFIT-PACKED POWER IN EACH BITE

Every time a WJ55 Blue Brute Hand-Held Rock Drill bites into rock . . . it makes a big dent in operating costs, too.

That's because Blue Brute Rock Drills give close bidders the kind of performance that means quicker, cleaner, deeper drilling for longer periods with less punishment to the runner.

And this 55-pound rock eater needs no babying because it's tough-muscled at such key places as — its positive-acting, end-seating valve, its rugged chuck housing and its smooth-operating rifle-bar construction.

Furthermore, this top-notch performance is doubly sure when you team up WJ55's with a Worthington Blue Brute Compressor. This portable power-house gets its punch from light, tight, efficient Feather* Valves, rigid alignment through 3-point engine and compressor suspension, full force-feed lubrication and other features. Comes with Diesel or gasoline drive.

Write today for more detailed information on why *there's more worth in a Blue Brute.*

*Reg. U. S. Pat. Off.

H7-9

KNOW YOUR BLUE BRUTES

Your Blue Brute Distributor will be glad to show you how Worthington-Ransome construction equipment will put your jobs on a profitable basis.

RANSOME EQUIPMENT

Pavers, Portable and Stationary Mixers, Truck Mixers, Pneumatic Placing and Grouting Equipment and Accessories.

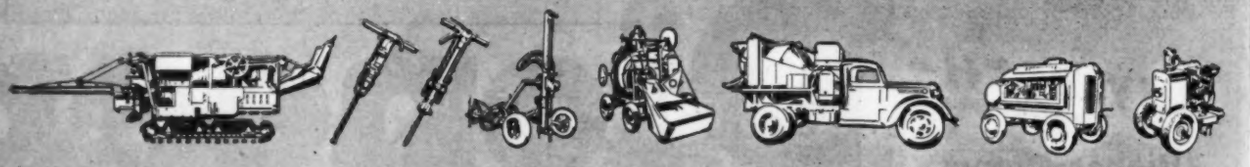
WORTHINGTON EQUIPMENT

Gasoline and Diesel Driven Portable Compressors, Rock Drills, Air Tools, Self-Priming Centrifugal Pumps and Accessories.

WORTHINGTON

Worthington Pump and Machinery Corporation, Worthington-Ransome Construction Equipment Division, Holyoke, Mass.

BUY BLUE BRUTES



IF IT'S A CONSTRUCTION JOB, IT'S A BLUE BRUTE JOB

How much . . . how far?

That's all you specify! . . .
with Pioneer Super-Service Conveyors

Here's a new, simple way to order conveyors. It saves you time and money. It assures the most satisfactory conveyor for your job.

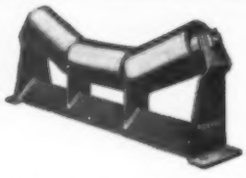
It's as easy as this. Tell Pioneer what material you want to move—how much—how far—and Pioneer takes care of all engineering details. You are assured of a Super-Service Conveyor pre-engineered to handle a *maximum load at the maximum incline.*

These new, standardized conveyors range in length from 30 to 120 feet—in five foot increments. Shipped knocked down or partially assembled, Super-Service Conveyors arrive on your job straight and true—ready for quick assembly. They save hours of set up time—meet varied conditions of lift.

For special jobs and fixed installations, Pioneer makes job-engineered conveyors. Write now for complete details.

PIONEER ENGINEERING WORKS

1515 Central Avenue Minneapolis 13, Minnesota



For Longer Life . . . Lower Upkeep

- ***All welded steel idler*** supports for strength with light weight.
- ***Inverted base angle*** on idler supports for self cleaning.
- ***Dependable Timken bearings*** for lasting performance.
- ***One-shot Alemite fittings*** with labyrinth seals retain grease, keep out dirt.
- ***Troughing idlers tilted*** in direction of travel—keep belts straight and true.
- ***Lattice frame construction*** for strength and rigidity.

BUY BOTH—

Higher Output,
Lower Upkeep!

Pioneer

Continuflo EQUIPMENT

LOOK AT THOSE TRACKS!

The LS-50 "signs off" with clean track marks. Shows how easy it is to maneuver this machine—no jerking, no jamming—just a smooth, even turn because steering action, like all the other controls, is correctly designed and built.

LINK-BELT SPEEDER LS-50
proves FAST and MANEUVERABLE
on Typical Highway Job

When the owner took delivery on this new LS-50 Shovel he put it to work at once on an important regrading and resurfacing contract, involving a lot of digging. And at once he discovered he had acquired a real shovel, that works fast, handles easily and maneuvers smoothly.

Day after day it is delivering record yardages of gravel from a 10 foot bank, keeping 9 trucks busy on a 2 to 6 mile haul. In addition to being satisfied with the power, speed and easy handling, which were all he had expected, the operator is especially happy about the smooth action of the drive and steering mechanism, which saves time and effort in maneuvering the machine into working position, as well as being extra easy on gears, clutches and brakes.

Performance like this doesn't just happen. It is designed and built into the machine, and into every one of the 25 Link-Belt Speeder models, from ⅜ to 3 yard capacity.

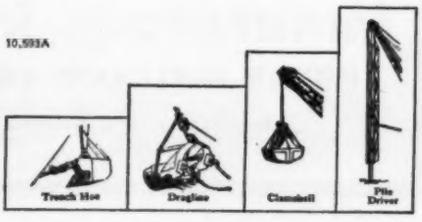
In the line of Link-Belt Speeder Shovel-Cranes there is a type and size to meet every requirement. And located near you is a Link-Belt Speeder distributor, informed, experienced and equipped to give you valuable aid in selecting machinery for your particular needs, and in keeping your equipment in top-notch operating condition.

The combination of skilfully designed, precision-built Link-Belt Speeder Shovel-Cranes, with interested, capable and cooperative distributor service, is your assurance of profitable performance.

CONVERTIBILITY COUNTS, TOO! . . .

The LS-50, like all Link-Belt Speeder Shovel-Cranes, is quickly and easily converted for use with any of the usual front end attachments. Whatever the job is, you can do it with a Link-Belt Speeder!

10,593A



LINK-BELT SPEEDER

LINK-BELT SPEEDER CORPORATION, CEDAR RAPIDS, IOWA

Builders of the Most Complete Line of SHOVELS-CRANES-DRAGLINES

Economical Versatility

Easy-handling MM Industrial Tractors have balanced weight and power, a wide range of speeds and front or rear power take-off for the efficient handling of a wide variety of attachments. Low operational and maintenance cost and easy accessibility for servicing recommends MM for use with: pull-behind and side-mounted mowers, V-type and reversible plows, bulldozers, rotary brooms, flushers, bucket or fork loaders, winches and cranes.

The MM 27 H.P. RTI and 49 H.P. UTI Industrial Tractors are BUILT TO DO THE WORK *conveniently, safely, economically.*

See Your MM Dealer — Distributor or Write

MINNEAPOLIS-MOLINE MM MODERN MACHINERY

MINNEAPOLIS-MOLINE
POWER IMPLEMENT COMPANY
MINNEAPOLIS 1, MINNESOTA

Stuck!

NoSPIN

would have kept you rolling!

Remember that day when a spinning wheel on your truck or bus cost you plenty? The time when one wheel spun helplessly on a slippery surface and the other wheel stalled because it had no power? Remember how you were stuck, your schedule upset, that big towing bill, how even life and property may have been endangered?

Well, Mister—here's the answer to that spinning wheel! It's "NoSPIN"! With a NoSPIN installed in your truck or bus axle, *both* rear wheels *must* rotate when power is applied. Let's see how NoSPIN can save you trouble and money, give you greater safety and more reliability.

First—It keeps your truck from getting stuck. Suppose your truck loses traction under one driving wheel. Without NoSPIN, you are stalled because, while the wheel with no traction spins uselessly, the wheel that *has* traction—the wheel that *could* pull you out—stands still! With NoSPIN, when one wheel loses traction, the other *still rotates with full power* and you don't get stuck. Result—schedules maintained, towing bills eliminated, hours saved, rubber and gas go further.

Second—NoSPIN equipped trucks and school busses are safer. Elimination of wheel spin means less skidding and slewing on slippery surfaces. When traction is poor you can speed up and slow down faster and more safely with NoSPIN. Result—fewer accidents, faster schedules, more reliability.

What is NoSPIN? It's a completely automatic device which replaces the conventional differential. Easily installed—available for most standard model truck axles. Ask your truck dealer or write us for more information on how NoSPIN can save you trouble and money.

DETROIT AUTOMOTIVE PRODUCTS CORPORATION
(Formerly Thornton Tandem Co.)
8701 Grinnell Ave. • Detroit 13, Michigan
Sold by Truck Dealers Everywhere

Look *into* UNIT!

FULL VISION CAB

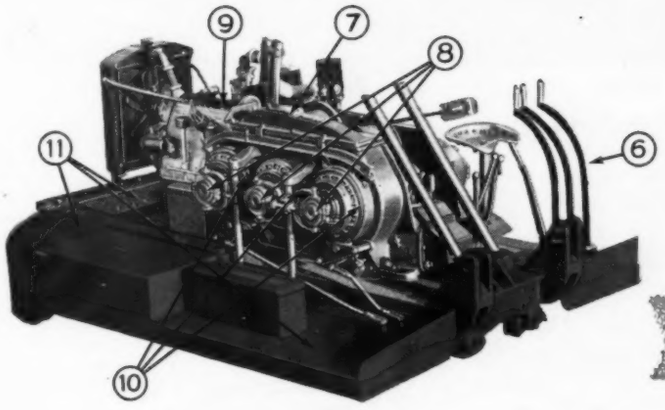
1. Streamlined to the minute in design . . . operator can see in ALL directions . . . clear visibility around a complete 360° circle, without sacrificing weight, capacity, or headroom.

2. Sliding side panels provide accessibility to motor and clutches.

3. Easily lifted top hood covers . . . locked from within the cab.

4. Shatter-proof Safety Glass used throughout the entire cab.

5. A Frame front legs and end connections are one-piece drop forgings.



MAIN MACHINERY

6. Curved operating levers . . . for easy operation and control.

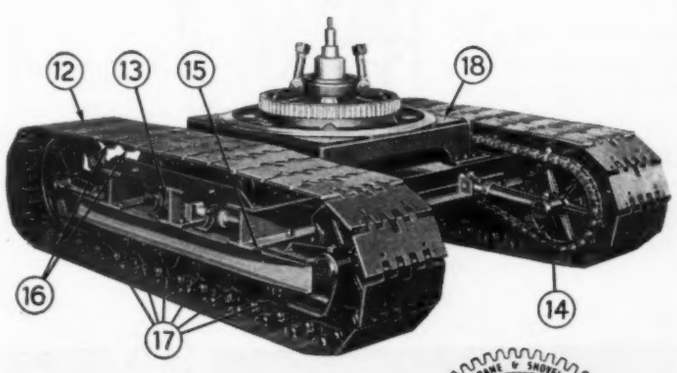
7. One-piece cast gear case completely encloses all gears and shafts in a constant flow of oil . . . Positive protection for all moving parts. Bored for perfect alignment by machine designed specifically for this accurate operation . . . misalignment is impossible.

8. Heat-treated alloy steel gears and shafts are involute splined. No keys to replace . . . no worn-out keyways. Large diameter shafts with short spans between bearings . . . minimizes deflection and bending . . . reduces bearing replacement.

9. Gas or Diesel engines are mounted in straight line with main machinery. Worm driven power take-off . . . silent, efficient, and compact.

10. All operating clutches are disc type . . . interchangeable . . . simple adjustment . . . mounted on high-speed countershafts instead of directly to drum shafts . . . smoother operation and longer life.

11. Turntable, Platforms, and Counterweight . . . These three important members are perfectly aligned, forming a single rigid unit that provides extra resistance to shocks and strains.



LOWER STRUCTURE

12. Multiple hinged shoes maintain alignment . . . minimize wear of shoes and tumblers.

13. Single adjusting screw for adjusting tread belt and drive chain enclosed in grease, free from dirt, rust, or outside damage.

14. One-piece end bearings with added outboard bearings maintain perfect and permanent alignment of drive shaft and end roller shaft.

15. Husky trussed frame . . . reinforced by one-piece end castings.

16. Drive Sprocket guides . . . prevent treads from jumping off if operating too loose.

17. Idler rollers are drop forged alloy steel . . . manganese bronze bushed . . . Alemite lubrication.

18. Heavily ribbed and flanged lower frame (carbody) of annealed alloy steel . . . roller track cast integral with body.

Automatic Traction Brakes are another exclusive UNIT feature! A friction type locking device for both crawlers . . . self-engaged by spring action . . . automatically released when power is applied. LOOK INTO UNIT . . . write today for catalogs and information.

½ and ¾ YD. EXCAVATORS * * * 5 and 10 TON CRANES

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UNIT CRANE & SHOVEL CORP.

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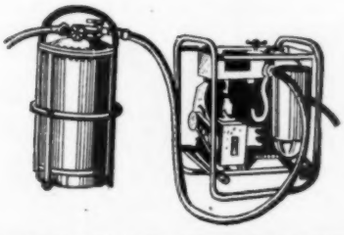
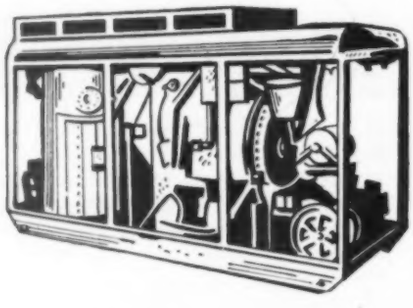
Army and Navy surplus—some used, some unused. Many sizes and types of Water Purification, Chlorination and Distillation units available at bargain prices.

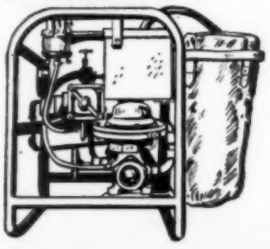
If you have not yet received your copy of the booklet pictured above, send for it today; it contains illustrations and descriptions of many available units other than those shown on this page, and tells where this equipment is located.



PORTABLE WATER PURIFICATION UNIT (MOBILE)—Consists mainly of a pumping unit and a filter unit. The water is cleaned by harmless chemicals. Forcing water reversely through the filter washes the unit thoroughly.



WATER DISTILLATION UNIT—Some units are trailer mounted, fully equipped with tires, ready to move to the working location; other units are portable—neat, compact and mounted on skid-type frames. Unit consists of a gasoline engine, steam compressor and other parts and necessary piping, all assembled and mounted on a structural steel base.



HYPO-CHLORINATION UNIT (AUTOMATIC) — Chlorinates from 2 to 100 gallons of water per minute. Unit consists of hydraulic operated hypochlorinator, water meter, pressure regulating valve and manual range adjusting valve.

For copy of booklet and details of current sales address any WAA Customer Service Center, mentioning sales Programs A-78 and A-79.

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WAR ASSETS ADMINISTRATION

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Customer Service Centers in these and many other cities.

says Combs Construction Company, Chattanooga, *about* MICHIGAN

This MICHIGAN owner, in a letter to Nixon Machinery & Supply Co., Chattanooga, goes on to say

". . . we have never gone wrong buying equipment that you recommend. Your claims were, if anything, conservative.

"We have used our MICHIGAN as shovel, back hoe, clam, dragline and in steel erection as a crane. In all operations it has proven a very efficient and economical machine. Operating and maintenance costs have been extremely low. Its mobility and flexibility, plus its other features has convinced us that it is an essential part of our equipment fleet.

"We recommend the MICHIGAN Model T-6-K, without reservations, for any work within its capacity."

Full details about the complete line of 3/8 yd. and 1/2 yd. convertible MICHIGAN Mobile SHOVEL-CRANES are available on request.

MICHIGAN
POWER SHOVEL COMPANY
BENTON HARBOR, MICHIGAN

FIRST CHOICE
with users

HERE'S the *right* tire for drawn vehicles and general traction—for low-cost, high-hour performance. It's Goodyear's All-Weather Earth Mover—sure-footed and easy rolling because its wide, rounded contours prevent deep penetration of the ground surface, reduce skids and slippage.

Not only the Earth Mover, but *all* Goodyear work tires are first choice with heads-up operators everywhere. And due to low-cost, long-life performance, Goodyears *stay* first choice. Year after year, *more yards are moved on Goodyear off-the-road tires than on any other kind!*

BUY and SPECIFY GOODYEAR *—it pays!*

A RIGHT TIRE FOR EACH JOB

ALL-WEATHER EARTH MOVER

SURE-GRIP for maximum traction on drive wheels

HARD ROCK LUG for super stamina in all rock work

All-Weather, Sure-Grip—T.M.'s The Goodyear Tire & Rubber Company

GOODYEAR

MORE YARDS ARE MOVED ON GOODYEAR OFF-THE-ROAD TIRES THAN ON ANY OTHER KIND

ROADS AND STREETS

OCTOBER, 1947 • VOL. 90 • No. 10

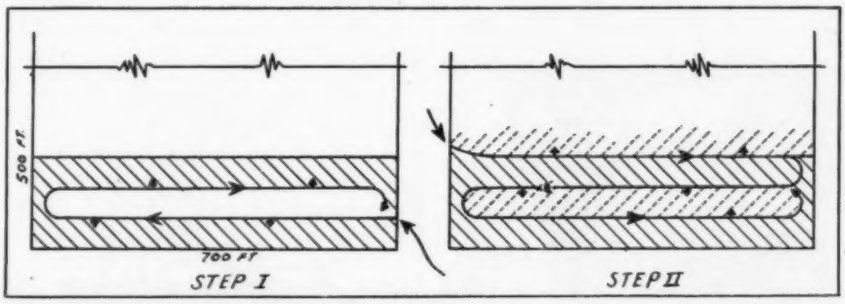
How D. W. Winkelman Co. Worked a

200,000 Cu. Yd. Borrow Pit

FILLING in of a swampy section of new right-of-way from a single huge borrow pit, is one of the unusual construction features of a 3.37-mile project on New York state's new Mohawk Thruway near Syracuse. Let last November to D. W. Winkelman Co., Inc., of Syracuse, this job connects with a section of the Ontario Thruway to the west (let earlier to the Winkelman firm jointly with A. S. Wikstrom).

While the engineering problems and details of design and field control here would make a highly interesting article, this brief pictorial report

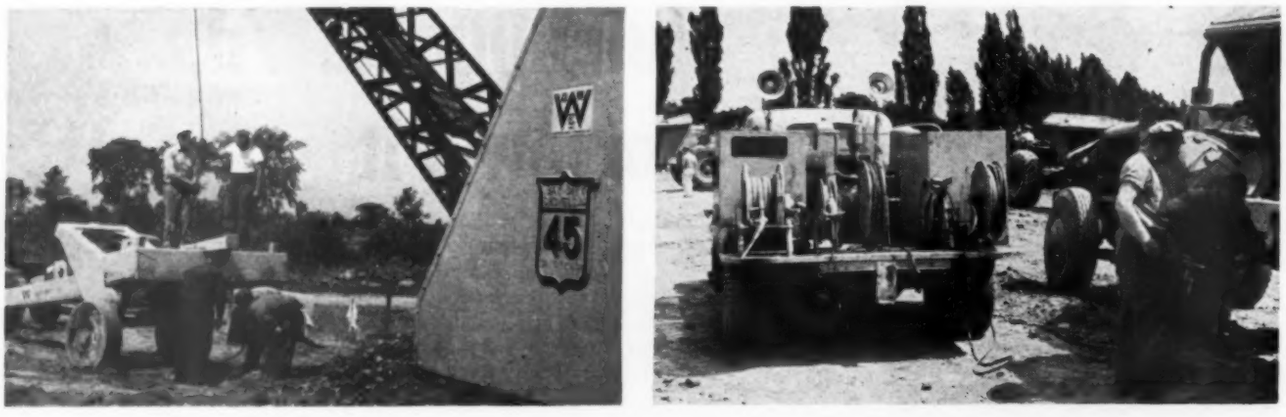
★ D. W. Winkelman and L. Cain, president and vice-president, respectively, of D. W. Winkelman Co., look over their contract for a section of the New York Thruway



★ Stages I and II showing how a pit 700 ft. long in direction of working, by 500 ft. wide, was tackled by the Euclid loader

★ Twelve Euclid 14-yd. wagons pounded the half-mile haul road, which was kept in the best possible shape by constant use of one or two graders plus occasional sprinkling

★ (Left): Two watchmen were kept on duty at all times at this crossing of a busy rail line—76 trains each 16-hr. double shift period. Light plant and floods required. (Right): This was a "10 Jeep" project, contractor and engineers alike finding these little wagons almost indispensable for getting about quickly over rough, soft or wet ground. One of Winkelman's Jeeps carried a torch, cylinders and tools for light repairs



★ (Left): Hoisting a 1000-lb. tooth into the heavy-duty ripper used to loosen cemented gravel and tight clay pockets in the borrow pit. (Right): A modern Alemite pressure greasing outfit caught greasing machines systematically at the edge of the pit

★ (Left): Pneumatic tamping was required around culvert backfill. (Right): Three of the 8 electric light plants utilized on this double-shift project. Most floodlamps were 1,000 watt

D. W. Winkelman Co. contract on upstate N. Y. job involved clamshelling swamp muck and careful backfilling

★ The Euclid loader took the 35,000 sq. ft. borrow area down in 18-in. cuts. Wagon sent away every 45 seconds including 10 seconds for get-away and move-up

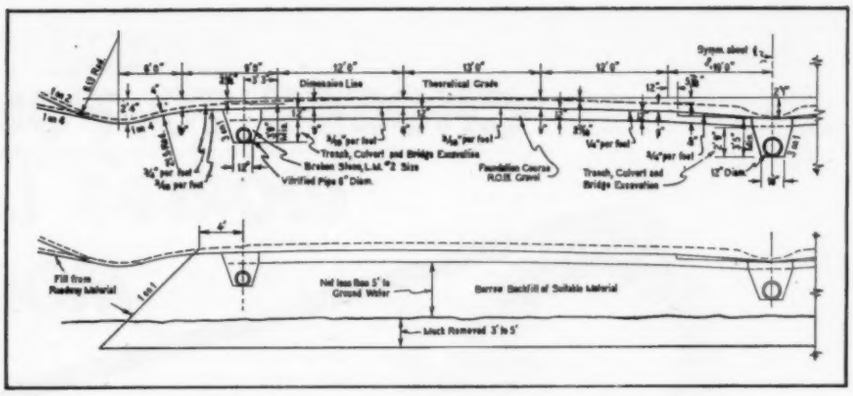
deals only with Winkelman's equipment and methods of working the borrow area, located about 3,000 ft. from the job. At the time of the ROADS AND STREETS editor's visit (July '47) weather had finally cleared up so that the contractor could make a belated showing of all-out daily production. Daily output reached as high as 12,000 cu. yd. per 16-hr. day with a single loader and 12-wagon fleet on an average one mile haul. See picture caption for some of the details.

As diagrammed on the preceding page, the 500 x 700 ft. borrow pit was taken down somewhat as follows: The loader first entered near one corner, at A, making the initial cut about 25 to 30 ft. in from one edge of the area. The loader turned around, coming back along a cut another 25 to 30 ft. inward, leaving an island. The shaded areas, see stage I, were cleaned up in successive passes, the depth of cut being usually about 18 in.

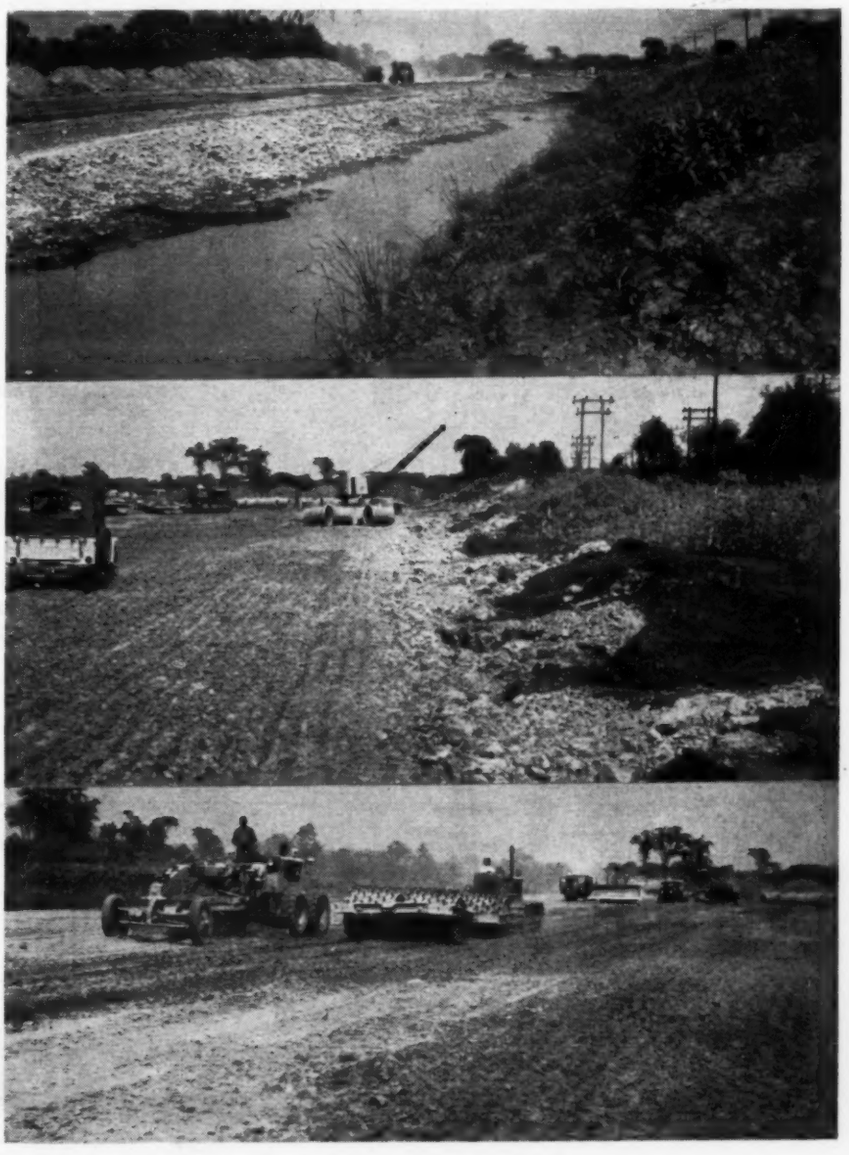
The second stage then began. Wagons entering at B followed a cut line which took the loader to a point where it could make a U turn and begin circling in on the island previously left in completing stage I. These two stages thus complete one lift over an area three lanes or 75 to 90 ft. wide. Then the process was repeated until the entire pit was crossed, then another "lift" began.

The broad 4-lane-divided roadways with 250 ft. R-W width involved in New York's Thruways, certainly eat up yardage per station. At this particular stage hauling was being concentrated on a section of roadway which traversed swampy creek bottom. Peat had previously been draglined out and piled just beyond the outer ditch lines. A carpet of suitable borrow material was being filled in by end-dumping and bulldozing progressively forward and outward either way from the centerline, displacing "bucket wash" muck and slime in the process. Over a mile of creek relocation, involving a stream channel 50 ft. wide and 6 ft. below existing ground, is included in the project, which with numerous structures and other features is costing $828,000 (contract price) for the 3.37 miles not including paving.

That the Thruway here could be awarded even at this price is due largely to the use of the big yardage outfit pictured. Kenneth C. Fuller is Superintendent for D. W. Winkelman Co., Inc.


Dimension Line
Theoretical Grade
Trench, Culvert and Bridge Excavation
Foundation Course
Fill from Roadway Material
Net loss Base 5' to Ground Water
Borrow Backfill of Suitable Material
Muck Removed 3' to 5'

★ Cross section of Mohawk Thruway—typical and through swampy ground —incorporates latest modern standards of design

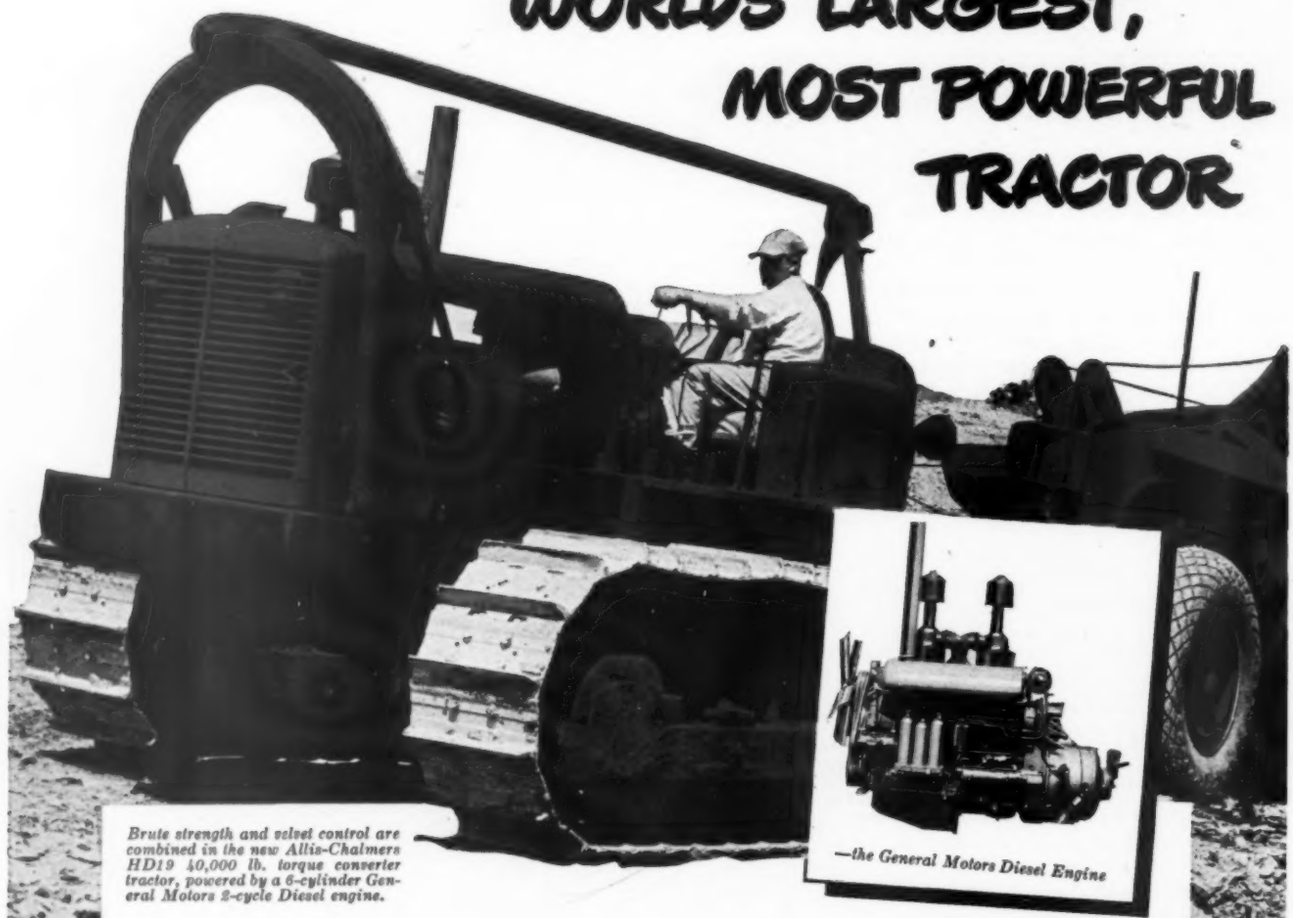


★ Progressive scenes showing with remarkable clarity the successive steps in filling and rolling backfilled select material through a swamp area. (Upper): right-of-way width previously mucked out, now being filled in from center out. Muck dikes from dragline seen at right

Middle: Note black muck bucket wash, boiled up during lateral displacement as backfilling was widened out to the shoulders

Lower: Placement and compaction in 6-in. layers was performed in 500 to 2000 ft. work sections. Borrow sand was spread over gravelly material so the equipment could work more easily

CHOSEN TO POWER THE WORLD'S LARGEST, MOST POWERFUL TRACTOR



Brute strength and velvet control are combined in the new Allis-Chalmers HD19 40,000 lb. torque converter tractor, powered by a 6-cylinder General Motors 2-cycle Diesel engine.

—the General Motors Diesel Engine

The new Allis-Chalmers HD19 tractor with hydraulic torque converter is powered by a General Motors Series 71 2-cycle Diesel engine.

To quote Allis-Chalmers, this new, mighty tractor was "built to get more work done—built to last longer with less upkeep." The GM Diesel with its wealth of smooth dependable power will do its full share in making good on both points.

Allis-Chalmers' selection of the GM Series 71 engine for the world's largest, most powerful tractor is in line with the thinking of more and more builders of shovels, cranes, soil stabilizers, pumps, air compressors, ditchers, dirt wagons and other heavy road-building and contractors' machinery.

The GM Diesel engine is the logical choice where quality of manufacture and PERFORMANCE count.

DETROIT DIESEL ENGINE DIVISION

DETROIT 28, MICH. ● { SINGLE ENGINES . . Up to 200 H. P. / MULTIPLE UNITS . . Up to 800 H. P.

GENERAL MOTORS

GM GENERAL MOTORS DIESEL POWER

DIESEL BRAWN WITHOUT THE BULK

Speed Change Lanes

Given Design Refinements in California

THEY don't call them just acceleration and deceleration lanes any more in the California division of highways. Speed change lanes is the group description—a welcome simplification. Also simplified is the state's procedure for figuring out the exact staking of such lanes. No longer a simple reverse curve but a pair of parabolas, this detail of alignment is considered of major importance in view of the dense, high-speed traffic so often encountered.

Heretofore the field force has had to compute the offsets by figuring each curve out. Now computations are greatly simplified by the notebook sheets reproduced herewith. Note that the average speed of travel is assumed to be .7 the design speed for a given project, and that various lengths of taper are figured out, based on various combinations of main roadway and ramp speeds. For example, as an extreme, a 315-ft. taper length is indicated for decelerating from a "70 mph." highway down to 30 mph.; and a 240-ft. length for dropping from a 60-mph. roadway to 40 mph. on the ramp. For the latter case, the Sheet 2 gives 3.0 and 9.0 ft. offset at points B and C for a 12-ft. offset (24-ft. lane), these points being 80 and 160 ft. along the taper line. The base line for the taper is usually assumed at 2 ft. offset from edge of adjacent pavement.

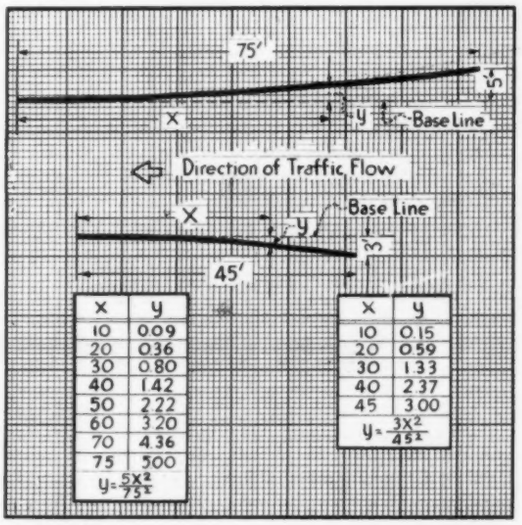
Reproduced here also are notebook sheets for staking curb flares and accurately forming rolled gutter transitions involved.

SPEED CHANGE LANES AND TAPER (LENGTHS)

	HIGHWAY DESIGN SPEED (V) mph				
	30	40	50	60	70
Av. Speed of Travel (.7V)	21	28	35	42	49
	TAPER, feet				
Deceleration	90	120	150	180	210
Acceleration	150	180	240	270	300

Ramp Speed	Min Radius	DECELERATION Lane, Including Taper				
20	50	90	140	225	295	370
30	130	90	120	150	235	315
40	250		120	150	180	240
50	500			150	180	210
		ACCELERATION Lane, Including Taper				
20	50	150	180	410	750	1180
30	130	150	180	240	510	950
40	250		180	240	270	550
50	500			240	270	300

★ Sheet 1



x	y
10	0.09
20	0.36
30	0.80
40	1.42
50	2.22
60	3.20
70	4.36
75	5.00

$y = \frac{5x^2}{75^2}$

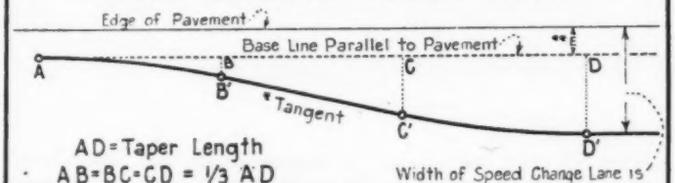
x	y
10	0.15
20	0.59
30	1.33
40	2.37
45	3.00

$y = \frac{3x^2}{45^2}$

★ Sheet 3

★ (Left): Sheet 2

TAPER FOR SPEED CHANGE LANES



AD = Taper Length

AB = BC = CD = 1/3 AD

AB' & C'D' are Parabolic Curves

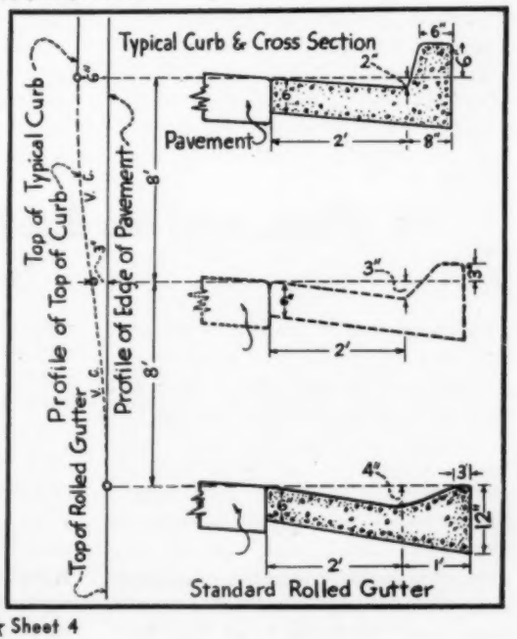
Width of Speed Change Lane is usually the same width as the adjacent lane

The following table gives offsets from a BASE LINE parallel to the EDGE OF PAVEMENT at intervals measured from point "A" Add "E" for measurements from edge of pavement.

Offset from BASE LINE			LENGTH OF TAPER, FEET							
			90	120	150	180	210	240	270	300
DD'=9'	DD'=10'	DD'=12'	Distance from point "A"							
0	0	0	-	-	-	-	-	-	-	-
0.14	0.16	0.19	7.5	10	12.5	15	17.5	20	22.5	25
0.56	0.62	0.75	15	20	25	30	35	40	45	50
1.27	1.41	1.69	22.5	30	37.5	45	52.5	60	67.5	75
B-2.25	2.50	3.00	30	40	50	60	70	80	90	100
*4.50	5.00	6.00	45	60	75	90	105	120	135	150
C-6.75	7.50	9.00	60	80	100	120	140	160	180	200
7.73	8.59	10.31	67.5	90	112.5	135	157.5	180	202.5	225
8.44	9.38	11.25	75	100	125	150	175	200	225	250
8.86	9.84	11.81	82.5	110	137.5	165	192.5	220	247.5	275
9.0	10.0	12.0	90	120	150	180	210	240	270	300

* Where Edge of Pavement is a curve, neither base line nor taper between B' & C' will be a tangent. Use proportional offsets from B' to C'

** The adopted offset "E" is usually 2' along outside edge of pavement and 0' adjacent to a curbed median strip but may vary in other cases.



★ Sheet 4

EDITORIAL

★ Kentucky Contractors Get Break

A blanket extension of 58 days has been granted Kentucky road contractors, due to the summer's unusual weather. Commissioner J. Stephen Watkins in granting this extension performed a service that in the long run will benefit the taxpayers of his state. For no highway program can gain at the loss of contractors, and this show of cooperation will help the state's contractors keep in financial condition to serve efficiently and take full advantage of the improved machinery now coming along.

Kentucky's contracts have definite penalty clauses. A state-wide check-up revealed that an over-all delay of 80 days occurred due to rains during the period between April 1 and August 15, as against a normal or average delay of 22 days.

Several months of constant rain can drain a contractor's resources; equipment rental is a relentless bookkeeping item. When practically all outfits are so hard hit that an emergency exists, as has been the case in much of the middlewest, relief from penalties will surely be repaid in the form of lower future bids and a better cooperative attitude all along the line.

Commissioner Watkins' decision also represents a good example of cooperative committee work. A committee composed of secretary W. O. Snyder of the Kentucky Association of Highway Contractors and Marion Ross of the Plant-Mix Asphalt Association conferred with commissioner Watkins, chief engineer T. J. Cutler and division directors, asking relief. A state highway committee comprising assistant chief engineer H. T. Carmichael, director of construction C. B. Owens and Mr. Snyder and Mr. Ross, surveyed weather experiences and agreed on the decision here noted.

While on the subject, why don't more states give bonuses for early completion of work?

★ State Contractor Co-op Groups

One of the most important suggestions to come out of the recent highway meeting in New York is the one that joint cooperative committees, representing local Associated General Contractor groups and the highway department, be set up in every state. A national "Joint Committee AASHO-AGC" has been in existence for some time, and your Editor has had the pleasure of listening in on several of their regional meetings.

A resolution recommending encouragement of the formation of such state committees was passed by the national joint group, and copies sent to highway departments and local AGC chapter heads. This idea is one that is long overdue and such a link should be sought also by other local highway associations.

Informal cooperative relationships already exist between contractors and highway departments, of course, and the business of sitting down across the table to talk over mutual problems always pays off. Little by little the old fence is coming down.

★ Plan and Budget for Snow

Of course now is too late to do any real planning or initiate major purchases on a planned basis for snow fighting in cities this winter. But it isn't too late for some laggard or overly optimistic city governments to think again and make last-minute purchases before a serious emergency occurs.

Snow removal costs tremendous sums in northern cities, but a single paralyzing storm such as hit Milwaukee last winter costs far more, and the economic loss from ordinary storms slowly cleared is always underestimated.

Milwaukee faces the coming winter with considerable new equipment. Other cities, such as Rochester with a record $675,000 appropriation for snow clearing, are being realistic. Many have made substantial additions to their fleet of trucks, plows, loaders, sanding machinery and other equipment, but in general the human tendency continues to be prevalent of dragging along and hoping that a light winter will be kind on the old prewar fleet.

Chicago's recent addition of a few modern loaders for downtown clearing provoked a timely editorial in the *Chicago Tribune*, which we quote in part as being widely applicable:

"Snow removal plans can't be made when a blizzard starts. An adequate street clearing program requires a

major mobilization of every available piece of equipment, all working together. Chicago's disgraceful record of letting every major blizzard tie its local transportation in a knot is caused just as much by lack of planning as it is by lack of modern equipment.

The ward street cleaning plan, whatever its merits in making the aldermen responsible to voters for municipal housekeeping in their wards, is totally unsuited to snow removal. That problem has to be attacked by considering the city as a whole.

"The second lesson is that regular street cleaning equipment cannot be converted efficiently to fight a blizzard. The best that plows can do is to push snow about. This is particularly true of those of the bulldozer type, which can be improvised by mounting blades on trucks or tractors. In residential districts such equipment can clear sidewalks, as it does in most of the suburbs of Chicago, and it can create narrow passageways on lightly traveled streets. It cannot get the snow off main traffic arteries, and that is essential to whip the delays caused by heavy snowfall.

"For such tasks improvised plows, private trucks, garbage trucks, and hand loading are inadequate and costly in comparison with the job that can be done by specially designed snow removal machines. Chicago has virtually none of this special machinery. It has, or hopes to have soon, three snow loaders, which would hardly suffice to clean up the loop after a blizzard, if they could do that."

The editorial concluded by advocating a coordinated plan of snow clearing and removal. Such a plan, implemented by better equipment and budgeted funds, represents an investment that any citizenry will endorse.

★ Radio A Wintertime Boon

It may be too soon to expect much new 2-way radio equipment on snow plows, but the state and county departments that have such equipment this winter also have an opportunity to supply further dramatic proof of its value. A news item from the Pennsylvania department of highways states that supervisory equipment and heavy trucks will be radio equipped on an experimental basis as soon as FCC permission comes through. Other states and many counties are making similar plans.

Last year the state maintenance superintendent in one Pennsylvania county lost touch for 36 hours with the crew of a heavy snow truck caught in the drifts. Radio dispatching would have kept this truck in touch, kept it working at a time when minutes were solid gold.

Specific comparative data are needed on plowing efficiency, with radio versus without. As a spur to laggards, more progressive departments should set up their books to gather all possible evidence to justify this new investment.

★ Explaining High Road Costs

Pennsylvania's department of highways is one of the leaders in keeping the public informed on highway matters. One of its recent releases to the press tells in simple language how much more a mile of new highway costs today than in former years, and why.

As one example, secretary Ray F. Smock cites U. S. 22 near the town of Huntington. It will cost $3,000,000 to bypass the town with a new location. The old road built in 1916 cost only $300,000.

Another instance is the modernization of sixteen miles of the Lackawanna Trail between Stroudsburg and Scranton, now under way. It will cost $3,200,000. The old 1920 construction cost $800,000.

These examples were cited only after reminding newspaper readers of the dramatic advances made in highway design to afford greater safety at higher speeds and accommodate traffic that has increased sometimes tenfold. This state like most others must eventually have new sources of highway revenues to build the roads the people want and need. Such campaigning goes on all the time in Pennsylvania, with accurate and reliable facts that the citizens can understand and use to draw their own conclusion.

★ Sign Replacement Threatened

The stringency in sheet steel and pipe is hampering highway and street departments—and manufacturers—in their effort to bring road signs, traffic signals and lighting up to date. As noted by H. J. Brunnier of the American Automobile Association in a letter to the American Iron and Steel Institute, reported in "Automotive News," this threat to motoring safety is all the more unfortunate because of the relatively small steel tonnages involved.

In making a plea for allotment of steel for this vital type of equipment, he noted that small individual purchases of steel are usually involved.

This allocation should be given the highest priority by the steel industry. With motor traffic now at an all-time high, we must get on with the huge program of sign and signal modernization, or the accident rate will climb. As far as directional and warning signs and markers are concerned, these are often manufactured in highway department sign shops, and perhaps the states and cities should get together on their purchases of metal materials where procurement trouble is being encountered.

Checked on all types of construction... for over 20 years

ON MAJOR HIGHWAYS and secondary roads, on "problem" paving, Midwest contractors and public officials have complete confidence in Ohio Oil Asphalts. Over 20 years of use in lowest to highest cost construction have shown that roads built of Ohio Oil Asphalts are long-lasting, economical, require minimum repairs.

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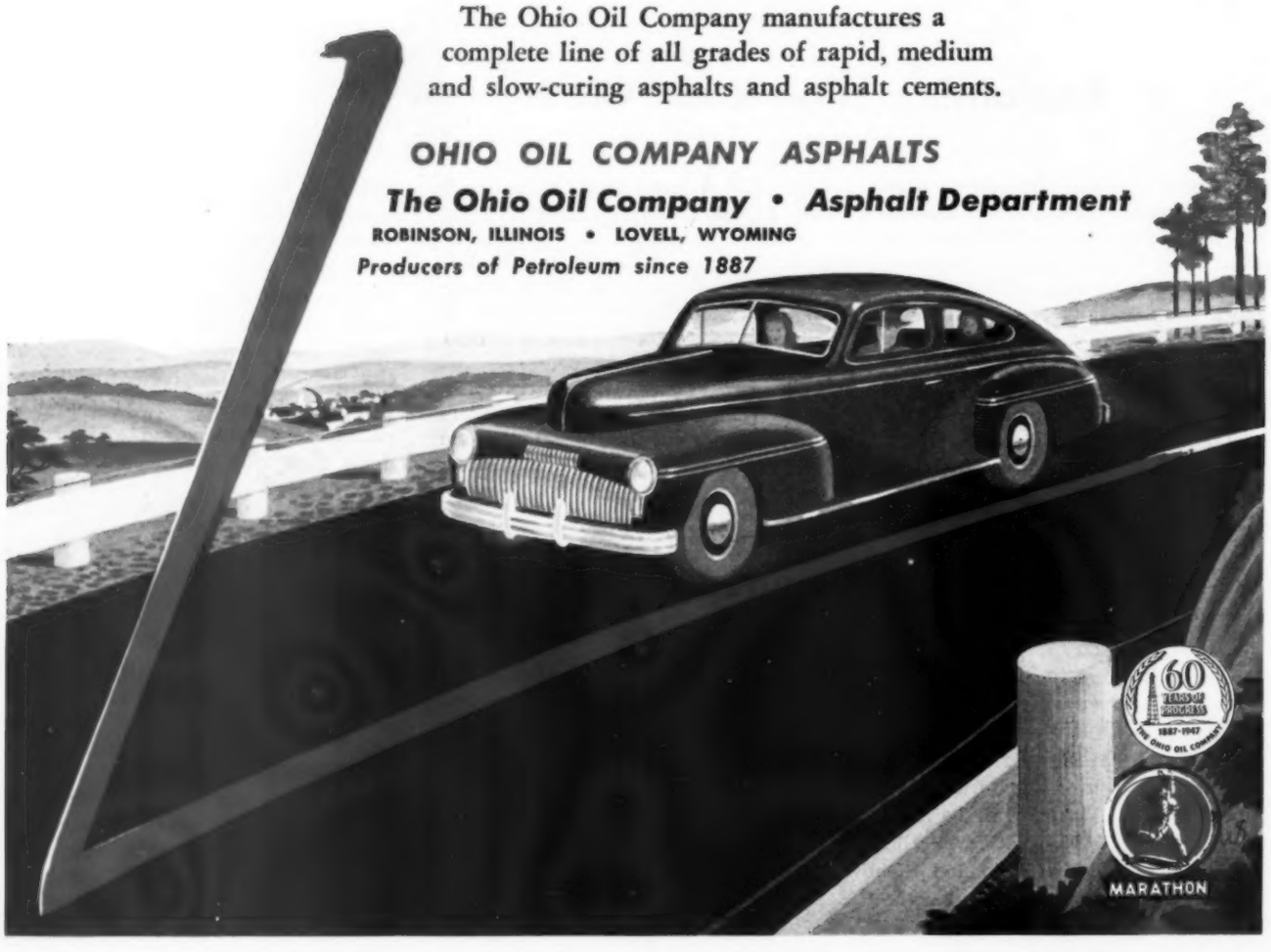


New Standards for Airports

Pose Special Problems for Contractors and Engineers

By Lowell H. Swenson
Executive Vice President
National Aeronautic Association

AIRPORTS thus far have been designed and redesigned for the needs of larger and larger airplanes. The issue is now being raised in hearings of the Civil Aeronautics Administration whether the planes henceforth should be built to fly from airports as they now exist.

Through the years, cities across the country have proudly commissioned new fields only to find that runway lengths have to be extended another 500 or 1,000 ft. to qualify for airline service. Until recently, it was thought that runways for big planes would have to be as long as two miles but 7,000 ft. is now proposed as the maximum.

Design criteria in tentative CAA regulations, up for hearings this month, would be fixed for airline service in four classes: feeder, local, express, and international. (See Table 1.) The result would be to establish standard runway and taxiway length, width, and loadings for each class. Thus the pavement thickness, concrete or flexible, would vary only with soil and climatic conditions for fields in each class.

This would not freeze aircraft design, it is argued, since planes can take off within the prescribed distances by proper loading in relation to their power and can stop through better breaking, including reversible pitch propellers. Pavement loadings are being reduced by the use of dual rather than single wheels. Landing gears for new sky giants are clusters of four wheels each.

Taxiways Failing

Present runways, many of which were built during the war to carry 4-engine bombers, are holding in most cases. But the taxiways, between the runways and the loading ramp, are cracking badly at many fields as aircraft move over them slowly and close together. The postwar change from 2-engine to 4-engine planes on the airlines and airfreight services has overstressed the pavements.

As the limiting of runway lengths will greatly conserve funds for new construction, the loading specifications will mean a major saving in maintenance. Flexible type paving must be resurfaced or made thicker, the cracking of concrete involves costly repaving or the placing of a new slab on top. A strong sub-base is of great importance. Some airport pavements have cracked in areas of little or no traffic due to temperature stresses and ground settlement.

Program Halted

Every economy in construction and in durability that can be effected by engineers is of especial importance in this period. Funds are limited by budget cuts in Congress and by the policy of states, municipalities, and private companies to defer building insofar as possible until prices of land, materials, and labor are more favorable.

Although Congress last year authorized a 7-year federal-aid airport program to the extent of $500,000,000 to be matched by state and local funds, the federal appropriations to date are only $77,500,000 and the work is barely starting. Though hundreds of small fields are being built, the present federal program calls for only three new airports of Class 5 or larger.

The airport program of the country is less than half finished. Total cost to date, nearly 80% by federal funds, is a bit more than one billion dollars in the continental United States. CAA recommendations for specific sites would cost at least another billion.

The increase of air passenger and air mail traffic, the phenomenal growth of air express and air freight, the great potential of private flying, and the new requirements of air defense are building a demand which must in due course call for a resumption of airport construction on a large scale. Meanwhile, the present slow period is a good time to develop detailed plans and study the most modern techniques.

There are now some 5,400 airports in operation in the United States. The gain of more than 1,000 over a year ago is mostly in small grass fields for private flying and flight instruction, built by private and municipal funds with the stimulus of GI flight training money from the Veterans Administration. Of the present airports, 70% are unpaved sod.

The future of the little fields depends on improvements of lightplane design for greater utility. CAA advances the theory that the new castered gear which permits crosswind landings will make it feasible to use single-strip airports, at least for private flying, with consequent saving in land and construction costs.

Development of roadable planes or 4-wheel flying autos, however, may indicate continued use of cross runways or grass fields for landings in any direction. A more helicopter or hovering plane, practical for general use, on the other hand, would require very little landing area. So the future shape of the personal flying field is still a matter of conjecture.

Hangars and Buildings

There is a considerable volume of construction ahead in airport buildings and structures. Hangar designs have not much changed in recent years, except for improved built-in

Airline Service	Runway, ft. Length	Runway, ft. Width	Taxiway Width, ft.	Landing Strip Width, ft.	Max. Pavement Loading, lb. Single Wheel	Max. Pavement Loading, lb. Dual Wheel
Feeder	3,500	75-100	40	300	15,000	20,000
Local	4,500	100-150	50	400	30,000	40,000
Express	6,000	150-200	75	500	60,000	80,000
International	7,000	150-200	75	500	60,000	80,000

★ Table 1. Proposed CAA Airport Design Criteria

features for fire prevention and protection. Administration buildings and other facilities, however, are being designed more scientifically than ever before. Style is simple and modern.

Emphasis is placed on flexible plans, so peak loads can be met and facilities can be expanded when necessary. On the other hand, thought must be given to the possibility of declining operations, as when private flying is removed from an airline field or airline operations are shifted to another site. The decline in the number of small non-scheduled air carriers in the past year has curtailed operations at some fields.

Each airport presents a separate design problem, depending on type of use as between airlines, airfreight, private flying and training, maintenance shops, etc. Fast growth of air-freight under new reduced rates is requiring expansion of loading and warehousing facilities, including refrigeration for perishables at some points.

Airport lighting and safety aids also are in an uncertain stage in many particulars since there has been considerable disagreement in the past year as to the best system. Tens of millions of dollars annually will be spent, however, for these facilities.

High intensity lights are being developed for best illumination of runways and approaches in periods of poor visibility. Lighting of small fields is encouraged by CAA both for safety reasons and as a means of revenue for the airport operators through private flying at night.

Forest Service Engineer to Retire

Theodore W. Norcross, chief of engineering division of U. S. Forest Service since 1920 will retire at the end of the year. He will be succeeded by

A. P. Dean

T. W. Norcross

Anthony P. Dean, since 1939 assistant regional forester in charge of engineering for the California National Forests with headquarters at San Francisco. James J. Byrne, now connected with the Pacific Northwest Forest Experiment Station at Portland, Ore., will take over the California engineering assignment.

Crandell to Head Safety Council Section

Frank Crandell, Assistant Vice-President, Liberty Mutual Insurance Company, Boston, Massachusetts, has been appointed General Chairman of the Construction Section of the National Safety Council for the 1947-48 year.

●

Forest Service Roads—Since 1920 about $470,000,000 has been expended under the direction of the chief engineer of the U. S. Forest Service for construction and maintenance of more than 76,000 miles of roads and 114,000 miles of trails.

Meetings Ahead

Highway Research Board—Annual meeting, National Academy of Sciences Building, Washington, D. C., Dec. 1-6.

Southeastern Association of State Highway Officials, annual convention, Miami, Fla., Dec. 7-.

National Material Handling Exposition, Cleveland, Jan. 12-16.

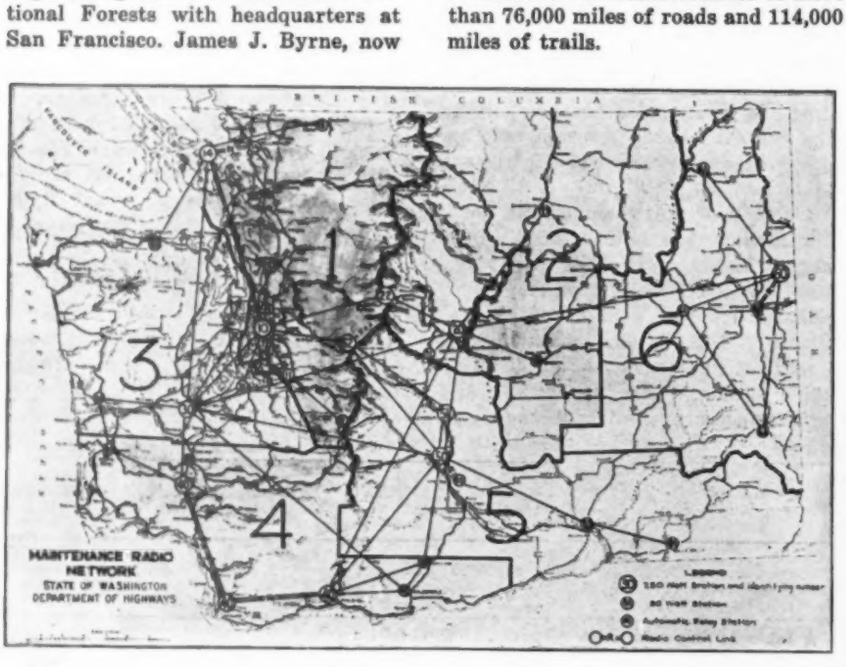
American Road Builders' Association—annual convention, Washington, D. C., Jan. 26-28. (1948 road show July 16-20, Soldier Field, Chicago.)

Associated General Contractors of America, Inc.—29th annual convention, Dallas, Texas, Feb. 9-12, 1948.

Associated Equipment Distributors —Annual meeting, Edgewater Beach Hotel, Chicago, Ill., Feb. 15-19.

Washington State Plans 32 Radio Stations

This map shows the locations of fixed stations operated by the maintenance division of the Washington department of highways. Not shown are 80 mobile units installed in cars, trucks and snow removal equipment.

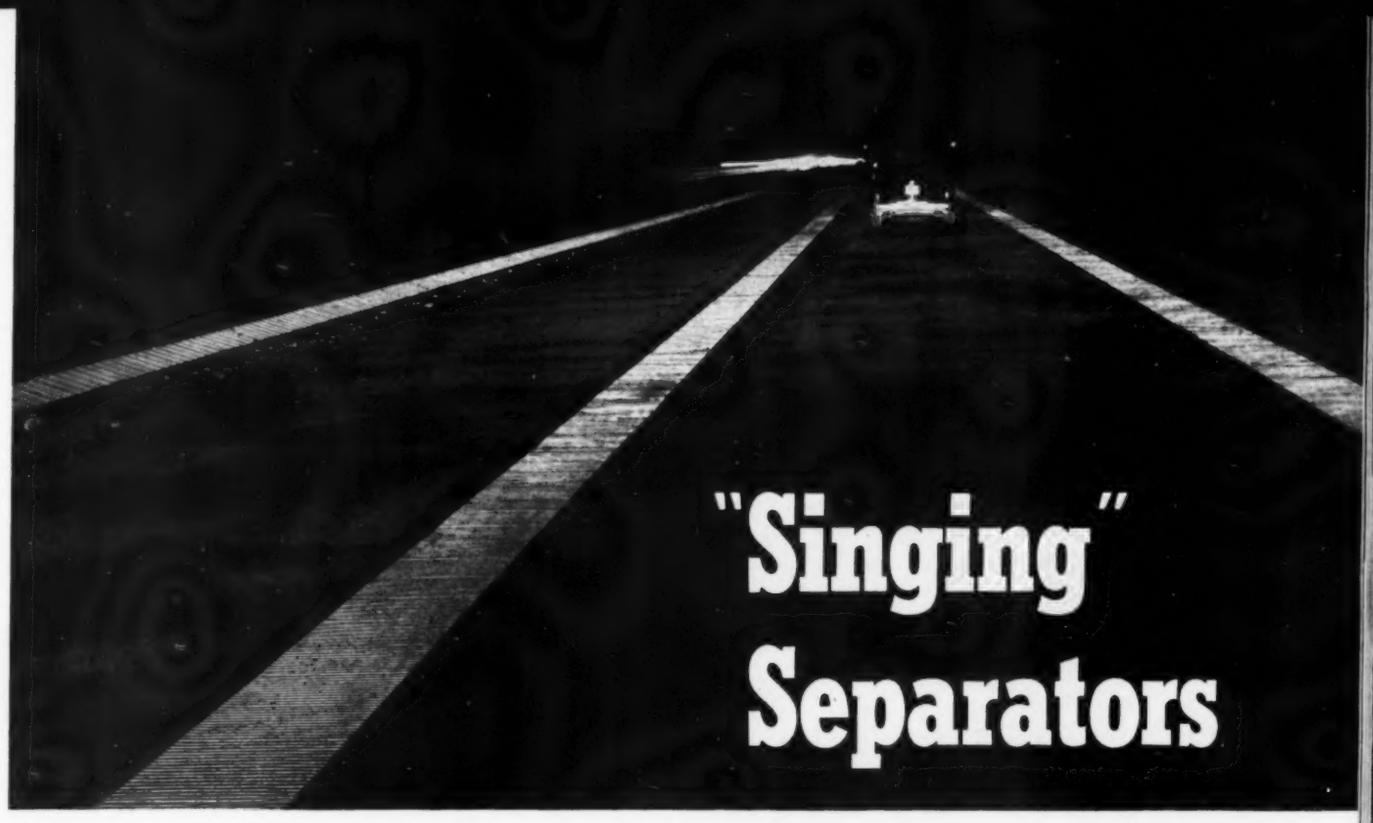


These stations, which are now operating on 39.14 megacycles, are to be moved to 37.98 megacycles late in 1947 to conform with the new frequency allocation plan for highway maintenance stations. A few stations are in the construction stage. Each district headquarters station can communicate direct with state headquarters, adjacent districts and stations at division points in the district. Both fixed stations and cars are operated on the same frequency. Almost any part of the state highway system is within two-way voice range of two or more stations.

Construction, begun Sept. 1946, and to be completed this winter, will include 32 fixed stations and about 180 mobile units.

Due to the mountainous areas in various parts of the state, it has been possible to place stations high and thereby gain a great amount of coverage which otherwise would be impossible. Good communication is possible over a radius of 100 to 150 miles from the larger stations located at the top of mountain ranges.

Clarence B. Shain, director of highways; J. H. Marshall, maintenance engineer.



"Singing" Separators

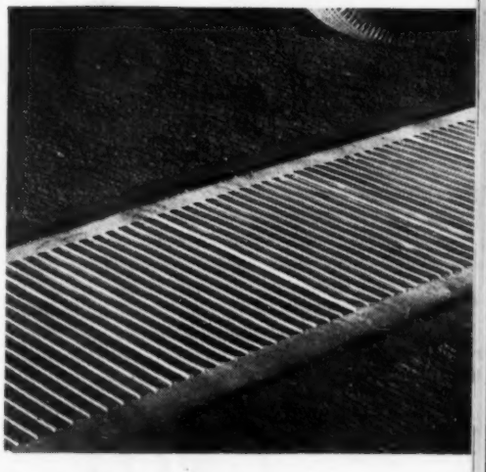
Corrugated White Cement Traffic Lane Markers Hum by Day, Reflect by Night

THE New Jersey state highway department has built into a section of U. S. 46 (N. J. route 6) a type of 2-ft. wide separator or built-in stripe designed to alert drivers day or night when they are "off the beam."

Located in Passaic County on a very heavily traveled six-lane section, this latest contribution to the department's safety campaign consists of concrete which has been corrugated so as to create a hum under tires. The idea isn't new, but this extensive use of it is noteworthy. White cement concrete is employed to give the reflector faces high visibility under headlights. The design is expected to reduce accidents caused by drivers weaving or changing lanes, and to be of special aid during low visibility periods of fog or rain.

Concrete pavement lanes are poured, leaving a 2-ft.-wide space full depth between lanes. Regular grey concrete is then placed in the space except for the top 1 in. of white cement mix.

George M. Brewster & Son, Bogota, N. J., was the paving contractor and Frapaul Construction Co., Inc., Rochelle Park, N. J., the marker contractor on this project.



★ Close-up of the corrugated surface as seen at night and (below) general views showing separators in relation to roadway. The "singing lanes" instantly captured the fancy of newspaper editors

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TD-18 with Bucyrus-Erie Hydraulic Bullgrader

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★ New high-line location is to go behind the bluff. Two 2-yd. shovels are casting down to the old roadside, where a 1½-yd. shovel loads into trucks

"Heavy" is the Word

for this California Relocation

Peter Kiewit Sons' Company moved 1,400,000 cu. yd. on 4.5-mile section of Roosevelt Highway north of Santa Monica. New 4-lane roadway rises back of sea cliff to avoid bad slide area

Project: Relocation of California state highway 60 (US 101 alt.) for 4.533 miles northward from Malibu Creek, north of Santa Monica. Grading, drainage, structures, paving and landscaping for modern 4-lane divided highway capable of carrying the heaviest traffic along this scenic shore route.

Contract: Awarded Oct. 14, 1946, to Peter Kiewit Sons' Co., of Los Angeles and Omaha, at bid price of $1,654,000. Culverts sublet to Young Construction Co., Inc.

Purpose of Project: To provide much-needed modernization of last remaining section of old 20-ft. road between Metropolitan Los Angeles and Ventura to the north. Also to by-pass an area of extremely costly slides and incidentally capitalize the scenic possibilities of a high-line location back of seaside bluffs.

Old Road followed the shore at about elev. 18. This 2-lane road with 40-ft. graded roadway hugged the base of a formidable shore cliff, subject to slides.

New Roadway will be graded 80 ft. wide this year and surfaced with two 23-ft.x8-in. concrete pavements in 1948. From 6 to 18 in. of granular base material is placed under pavements, the top 4 in. to be cement treated.

Dividing strips will vary from 4 to 12 ft. in width. The 4 and 10 ft. shoulders will be bituminous surfaced. Grades will not exceed 7%. The new location diverges as much as a quarter mile from the old shore line, rising to about elev. 200 back of the bluff, descends to utilize a widened and raised portion of the old route (across mouth of Solstice Canyon), then follows the old route with minor deviations to northerly end of project.

Stabilization of a section of high-

★ Looking south toward the southern end of the project, Malibu Beach, playground of movie stars seen in background, skirted by old shore route. New roadway in foreground; intersection with old road being graded in distance at left

★ 20% grade (plus or minus) down from a hilltop borrow area

★ Both push and pull tractor were utilized to speed loading of self-powered scraper in hard, dry hilltop borrow, aided by rippers

way traversing an old slide area was deemed necessary. Since the slide (1941) was of the flow rather than the slip-plane type, installation of a sand drain to reduce saturation was considered sufficient. Extra embankment width on the ocean side was also provided here.

Structures include four long reinforced concrete arch culverts 8 to 21 ft. in diameter and a 30-ft. filled arch bridge across canyon mouths.

Million Yd. in 4 Mo.

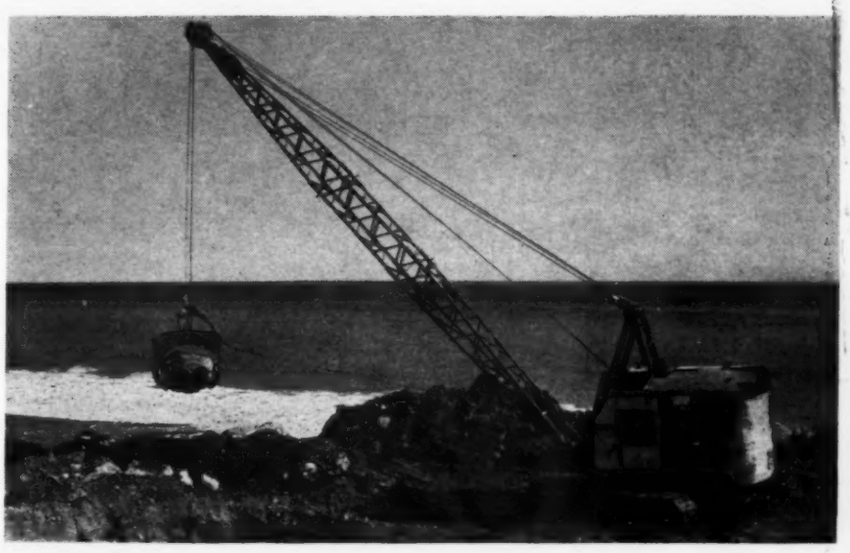
Construction Notes: By making skillful use of a surprisingly small outfit of modern heavy equipment, the contractor moved nearly 1,000,000 cu. yd. during the first four months of operation, working two 8-hr. shifts. A peak of about 15,000 cu. yd. daily was reached, working up gradually from less than half this output. The

★ One of the 2-yd. shovels alternated between overcasting from the bluff and loading wagons for lengthy hauls to the big canyonmouth fills

★ A Koehring 1½-yd. clamshell performed various tasks. Here it is picking protruding boulders out of the slope of a large cut, which was dressed down originally by a patrol grader towed by a tractor moving along top of cut

★ Dumping rocky material, twice handled by shovel from the bluff top

★ 5-tired heavy pneumatic roller, drawn by Minneapolis-Moline tractor, used in topping out the grade



★ Big boulders which rolled on the beach during blasting of the seaside bluff were buried with grapples to form the toe of riprapping. Crane is a ¾-yd. Northwest

entire 1,400,000 was due to be moved by Oct. 1.

The scraper outfit consisted in general of 2 LeTourneau carryalls (16 yd.); 2 LeT. self-powered scrapers (12 yd.); 7 double-drum sheepsfoot roller units; 1 heavy-duty tractor-drawn pneumatic roller (5 large tires); 2 Sterling trucks with 4500 ga. water tanks; 11 Caterpillar tractors (6 with dozer or pusher equipment).

Both push and snatch tractor were used along with a rooter to speed loading of hard, dry clayey material. Carry-alls operated on somewhat longer than average hauls.

The bulk of the yardage in the job, however, proved to be shovel work. In addition to a spectacular hill-top operation to be described, widening of the old roadway toward the north was accomplished largely with shovel material. Wagons and dump trucks accounted for most of the 14,500,000 sta. yd. overhaul, material going into heavy fills across canyon outlets, widening, or spoil for washing out to sea.

★ On this high fill, surface drainage is carried away thusly from catch basins at shoulder line—prevents erosive surface washing

The shovel outfit comprised one 2-yd. and two 1½-yd. Northwests; from 4 to 10 12-yd. Euclid end-dump trucks; 7 16-yd. Euclid bottom-dump wagons; 4 Ford trucks with special rear end equipment; 3 heavy-duty rippers.

Shovels put on the real show. The high bluff along the southerly half of the job was tackled both from the seaside and from behind, 80,000 cu. yd. being overcast or dug from the face and 50,000 cu. yd. loaded into bottom-dumps to the rear. One and sometimes two shovels perched on benches 150 to 200 ft. above the sea, cast down to another shovel reloading at the base of the bluff.

Additional Kiewit equipment in-

★ How the Kiewit firm stored diesel fuel near the shop area at one end of the job

★ Water storage tank, located at a creek, was designed with 6-in.-diam. spout for quick filling of 4500-gal. sprinkler trucks

★ This contractor believed in good housekeeping, even in outdoor western-style field shop area. Note concrete working floor, and method of mounting shovel and scraper cable up out of the dirt

★ Six portable houses located in a neat row alongside at the contractor's service area, included 1 for shop office and cost keeping, 1 for tools, 4 for parts and supplies

★ Complete overhauls, reconstruction of body and frame members, general welding and torch work, all performed on concrete-paved working area

★ One of the large reinforced concrete arch culverts necessary at canyon outlets

cluded a ¾-yd. Northwest crane and a 1½-yd. Koehring dragline, used for various tasks.

Some of the Quantities for this 4.533-Mile 4-Lane Project

1,420,000	cu. yd. roadway excavation.
30,000	sq. yd. compacting original ground.
16,500	cu. yd. structure excavation.
36,000	cu. yd. ditch and channel excavation.
14,500,000	sta-yd. overhaul.
17,000	cu. yd. sand filling.
1,080	tons SC-3 liquid asphalt for surface treatment.
87,500	sq. yd. mixing and processing surface treatment.
1,900	tons plant-mixed surfacing.
9,230	sq. ft. plant-mixed surfacing for slope drains.
17,200	cu. yd. p.c. concrete pavement.
118,000	sq. yd. cement treated base.
2,340	cu. yd. structural concrete.
330,000	lb. reinforcing bars.
700	tons rock backfill.
2,200	cu. yd. concrete curb and gutter.
11,500	tons heavy stone riprap.
3,800	lin. ft. conc. pipe (18 to 42 in.).
440	ft. corrugated iron pipe.

Personnel: Project is under supervision of the Los Angeles district, California division of highways, S. V. Cortelyou district engineer; Frank B. Cressy, district construction engineer; E. L. Seitz, resident engineer. L. B. Smith is chief engineer for Peter Kiewit Sons' Co., Los Angeles; H. C. Studer superintendent and John McLaughlin project engineer.

Motor Vehicle Production—Factory sales of passenger cars totaled 1,721,391 units in the first half of 1947, compared with 640,624 in the same period of 1946. Of the 1947 sales 1,589,563 were for the domestic market and about 7.6 per cent for export. Truck factory sales numbered 618,318 in the first 6 months of this year. The domestic market took 485,801 units, the remaining 21.4 per cent being exported.

MAGELLAN MIGHT HAVE MADE IT

IN 1519, Ferdinand Magellan set sail in five antiquated vessels in an attempt to circle the globe. He died before the voyage was completed although one of the ships did win through after three years of hardship. With power, even in its most elementary form, Magellan might have lived to see the success of his great adventure.

It was nearly three centuries until the successful voyage of "Fulton's Folly" proved that power at sea was practical. Since then, it has made giant strides of progress and in a short half century, Diesel engines have found an ever-growing usefulness.

Today, internal-combustion engines of all kinds are serving the world in its struggle for reconstruction.

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American Bosch serves the internal-combustion-engine industry in three vital ways:

ENGINEERING. 1,200,000 *man-hours* of it have been poured into Diesel fuel injection alone—other millions into ignition.

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MAINTENANCE. *The world over,* American Bosch authorized service stations keep the equipment operating efficiently.

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AASHO Meets at Waldorf

- *Retiring President C. W. Phillips (Tenn.) challenges highway departments to "clean house"*
- *Several leaders plead for highway user groups and auto, petroleum and rubber industries to join forces with engineers toward sound highway development and cease obstructive lobbying*
- *Expressways and metropolitan programs spotlighted, but bulk of time devoted to 14 technical committee sessions*
- *Public relations responsibility of highway departments clarified (see later issue of Roads and Streets)*
- *Contractors and construction problems represented through AASHO-AGC Joint Committee meeting, and through contractor delegates at Construction Committee session*

WHILE the nation's huge and insistent program of highway modernization must finally be carried out by technical specialists, its future fate hinges on the vision, sound planning and public leadership of highway administrators and legislators.

This is the clear reminder from attending the 33rd annual meeting of the American Association of State Highway Officials, held in New York, Sept. 22-26. The scene was the superluxurious Waldorf-Astoria, and at times one forgot that roads are built out in the dust, mud and heat, amidst churning tractors and fleets of Buck Rogerish monsters which contractors pit against weather, union restrictions and human foibles to get our roads actually built.

Gov. Dewey, Road Leader

The "greetings from the governor" phase of this convention, instead of being the usual perfunctory business, was turned by New York's governor, Thomas E. Dewey, into a stirring challenge. He took this occasion to inform New York citizens that a 2-billion-dollar outlay for roads in New York state is necessary by 1960 —$143,000,000 annually. Quoting a report from director of public works Charles H. Sells, he said that the state's $840,000,000 5-year postwar road program, now under way and involving a state-wide Thruway plan, has been outdated by expanding traffic requirements and mounting construction costs.

In the midst of a penetrating statistical picture of highway service in his state (3,000 New York communities have no land transportation link except highways), Governor Dewey took time to strike out at the enemies of highway progress. We quote him in part:

"It is pretty discouraging, however, to hear voices still being raised against the expenditure of the funds necessary to maintain and expand our highways. In every political campaign, and sometimes in between, the irresponsible statement is made that modern highway transportation is just a frill or a political pork barrel or a luxury. Of course if the people ever listened to those voices, our standard of living and our civilization itself would start going backward. A serious threat to the progress of this country exists in those demagogues who would concentrate public funds on new governmental ventures, leaving the fundamentals of our transportation system to starve and wither away. They would make of our country a collection of isolated communities and of our economy a shrinking and dying thing. The facts are more compelling than any words can be.

"The ultimate fact is that everything we eat or wear, everything we own, everything we may have to sell or buy has been or will be moved at some time over or serviced by the public highway system. Cities are linked to airports by highways. Merchandise and raw materials shipped by rail or water must also move on highways or through city streets. The economic wheel can turn only so long as the transportation system on which it runs is geared to meet its ever-rising tempo.

"These same advocates of disaster who fail to understand the function of the highway believe it is only for the rural population. But they forget that it serves the people of the cities even more than those outside the cities. They also forget that today in our state and in many states, State Government has taken over many of the most important aspects of the city streets. The day has passed when the state or national government can build great highways up to the borders of cities and then dump an enormous traveling public on to narrow city streets to fend for themselves. That practice has created great bottlenecks in the cities, congested their streets, depreciated their land values and by the congestion impaired the usefulness of the highways themselves. It is for that reason that the state of New York—and many of your states —have taken over responsibility for continuing great arteries of transport through the hearts or around the edges of our cities."

Plea for Unity

In one of the most significant utterances on national highway affairs in our time, retiring president C. W. Phillips, Tennessee highway commissioner, also took the enemies of road programs and the bickering factions to task. We quote at some length here in the belief that ROADS AND STREETS readers of all ranks and oc-

★ Governor Thomas E. Dewey is in this photo. Can you find him? Maybe you are here, too?

cupations should read and take stock:

"Highway transportation once considered secondary is now the *primary* system of transportation. If those of us who have lived with the struggle to create such a system, could show the people the problem that we have been fighting so hard and so long, our task would be much simpler. It is on this thought that I wish to dwell, in the vain hope that I may in some way reach a sound and fundamental basis—one on which the user of the highway can quickly see at one panoramic glance the help and support that is needed.

"The public, generally speaking, still looks upon the highway as one strictly for the use of local traffic, and does not realize the importance it holds for the traveling public—as a whole.

"The 'Federal Aid Highway Act of 1944' seems to have the framework to cover all fields of highway needs—Regular Federal Aid—urban, and secondary. Yet in our anxiety to develop one particular type in which we are most interested, we are prone to be fighting among ourselves. . . . How much better if all groups would coordinate their efforts in one movement for highway transportation, instead of organizing as individual groups for one specific type of transportation. After the money available for highway use has been determined, then representatives of urban, rural, and the connecting highways, should agree on an equitable allocation for the three. To me, it is this lack of unanimity of purpose that keeps the public in a state of confusion . . . So it is or should be with our nation's highways. We find certain groups of highway users interested in arterial highways only. We find other groups interested in expressways in cities, and still others who are interested only in the rural roads—and yet it is the responsibility of the state to have an adequate system for all, dependent upon the amount of revenue received. This confusion is bringing about a fight by some to decrease the highway user tax. If all highway user revenue was being used for highway purposes, we would have a system of roads for all, which would be satisfactory, and the fight of one against the other would not exist. While this fight is going on, activities other than highways continue to benefit. Realizing this, we must definitely decide whether gasoline taxes and license fees are to be used for highway purposes, or be collected as a general tax.

Keep F. A. Relationship

"Let us go back for a moment to the beginning of federal aid for highways. There have been many things that have seemed difficult under this system, and yet *had it not been for the method of appropriations and advance programming between the states and the Federal Government, as set out in the original Federal Aid Act, highway development would be much farther behind than it is at present.* We would not have the splendid system of arterial highways across our nation had it not been for the ability to plan ahead and have the Federal Government join the state in its obligation.

"Despite this, there is a concerted effort to break this contractural relationship between the state and Federal Government. This is where the full support of all highway user organizations is needed. The future outlook is far from being optimistic, and unless and until, all interested parties can sit down around the table and plan the future of highway development, just so long will this pessimistic outlook be prevalent.

"Automobile manufacturers, petroleum and rubber producers are beneficiaries of this great transportation system of ours. Why then can't representatives from these, together with the highway engineer, sit down around the table and work out an over-all formula for the future of highways? Engineers are capable of building an adequate system of highways, but engineers are not capable of competing with the heavy financial weight of outside organizations. Engineers, if left alone, want to build roads where traffic demands, and they will make ample allowance for proper traffic increase, but engineers cannot combat lobbies that are formed for specific objectives.

"I am not saying that a highway department, composed of technical engineers, does not have a duty to perform outside of engineering. Every highway department throughout this nation should virtually 'clean house.' Those employees not geared to the present tempo of roadbuilding should either be removed or placed in a position of lesser responsibility. The environments under which the present-day system has been built were much more liberal than the environments under which future highways will be built. The people have a right to know if their money is being economically and justifiably spent. Overdesign on one particular section of road at the expense of other roads throughout your system are things the public has a right to know about. We cannot place ourselves on a pedestal and have the idea of 'take it or leave it.' If the need for the highway is there, then we cannot let local interest divert us.

Some Compromise Designs

"The engineers definitely must realize that we have a vast amount of money invested in our present highway system, and this cannot all be thrown away for modern standards. All roads cannot be replaced at once with a high standard road. The engineer cannot be arbitrary in his de-

New AASHO Officers

President: R. H. Baldock, Oregon.

First Vice President: W. W. Polk, Illinois.

Regional Vice Presidents: First Region, Spencer Miller, Jr., New Jersey; Second Region, F. E. Bayless, Florida; Third Region, W. G. Scott, Nebraska; Fourth Region, A. F. Winkler, Montana.

Treasurer (re-elected): G. H. Henderson, Rhode Island.

Executive Secretary (continuing): Hal H. Hale, Washington, D. C.

Members of the Executive Committee: J. A. Anderson, Virginia; C. W. Brown, Missouri; T. H. Cutler, Kentucky; D. C. Greer, Texas; R. H. Leavitt, Utah; T. H. MacDonald, Dist. of Col.; C. W. Phillips, Tennessee; C. H. Purcell, California; H. E. Sargent, Vermont; C. H. Sells, New York; F. R. White, Iowa.

sign, but in many instances, will have to take a road which is not up to standard and cure as many ills on it as it is possible to do."

Hits PRA Red Tape

Commissioner Phillips also deplored among other things: (1) The automotive industry's policy of developing new vehicles without cooperating with highway builders, resulting in conflict on truck and bus weights, auto speeds, etc. (2) The trend toward toll roads which threatens the interstate highway program. (3) The lack of discretionary powers in federal highway district offices, which results in both state and federal "home offices" becoming so "engrossed in organizational functions that they forget the job they are asked to do—furnish safe, comfortable economical transportation."

Senate Leader Speaks

Other speakers on broad phases included John S. Cooper (Ky.), member U. S. Senate Committee on Public Works and chairman Subcommittee on Roads. He advocated continuing present federal highway aid policies, continued development of the strategic network for long-range security reasons, building of a connector between the United States and the southern end of the present Alaska Highway and maintenance of that highway also for strategic reasons.

Commissioner of Public Roads, Thos. H. MacDonald, revealed that $1,645 million in postwar state highway work has been placed under contract, and defended states criticized for alleged slowness in letting projects. Contract unit prices are up 16% over 1946, he noted, and up 66% over 1940.

The federal-aid grade crossing program has moved ahead until 459 separation projects are now completed or in work; also 902 protection projects involving flashing lights or barriers.

Noting that 9,800 state highway positions remain unfilled today, Commissioner MacDonald urged highway heads to attack their personnel problem with the same vigor as they have applied to technical problems. He urged continuation and extension of highway planning surveys, as a basis of factual data to be placed before congressional and state legislative groups. He also asked for fullest use of mass transportation in urban highway planning, as a means of reducing congestion and saving funds.

Additional details of the extensive AASHO annual meeting at the Waldorf, New York City, will be presented in a latter issue of ROADS AND STREETS.

Construction Committee Notes

From Recent AASHO Meeting, New York

OUT of the fourteen technical committees of AASHO which met recently simultaneously at the Waldorf, we chose personally to sit in on the Construction Committee. Chairman C. M. Hathaway, veteran construction engineer of Illinois, presided, with M. B. Christensen on hand for A. C. Clark of Public Roads Administration, committee secretary.

This lively meeting got going with a round-table on the relationship between engineers and contractors. Ernest L. Merrill, Maine, suggested that contractors and engineers ought to "go fishing together", or otherwise get better acquainted as a means of clearing their minds and ending arbi trary attitudes. Many large contracts are carried out today without friction between the contractor and the engineer, he noted. Engineers need to develop a better sense of humor, and incidentally to quit splitting hairs on materials tests at times. Day-to-day variations in tests are often matters of human error and nothing is to be gained by keeping the contractor in hot water over smallest details.

Winkelman Speaks for AGC

Dwight W. Winkelman, New York contractor who is vice-president of the Associated General Contractors, discussed engineer-contractor relationships, observing that engineers and the contractors today are the "same kind of folks." Contractors are found increasingly to have an engineering background and to hire engineers, while many highway department men have worked for contractors or done contracting.

Cooperative relationships should be founded on mutual understanding and confidence, said Winkelman, as an aid to more economical construction. He pointed to the successful AASHO-AGC Joint Committee and reminded that over one-third of the 5300 AGC members are highway specialists and that 100 local AGC highway chapters offer a ready means of greater cooperation.

Many contractors formerly made up in "drive" for lack of other abilities, and a "cops and robbers" atmosphere resulted in their relationship with highway departments, he continued. Now contractors are business men who realize that it is to their advantage to follow specifications. Constant betterment in methods is necessary if a contractor is to stay in business today. Engineers can do much to help develop the able contracting organizations without which a highway program cannot succeed.

Mr. Winkelman cited efforts to secure unreasonably low bids through too-low estimates, as one source of poor relationships. A contractor who bids too low will likely cause bickering over performance.

The contractor's need now is to train operators and make fullest and best use of modern machinery. Engineers too should follow equipment developments, so that they can change designs and specifications to take ad-

vantage. The practice of specifying both procedure and results (as in compaction) was again brought up by Winkelman, who urged clearer plans and specifications that will enable contractors to do with less contingencies. Designers ought to go into the field more, and particularly to observe the capabilities of new machinery. He suggested that highway departments arrange with new local AGC chapters for such field trips.

Contractors cannot be criticized for sometimes attracting engineers through better pay, because they must do so to compete, and usually offer the engineers greater responsibility.

In the discussion after Winkelman's talk, an Ohio delegate told of his state's policy of staging conferences between the division (district) construction and project engineer and the contractor after awarding, to help arrange the best schedule of construction work. Illinois and certain other states follow a similar procedure.

Hal Hunt of *Engineering News-Record* suggested that greater effort be made by the highway departments to get engineering college students into highway work (through the profs.). Hathaway suggested that the highway professors should be induced to feature highway engineering more prominently in their curricula. He said that this past summer Illinois employed 75 students as plant and pavement inspectors, etc. A New Jersey spokesman suggested that high school seniors be interested systematically in a highway career, in time to specialize in college.

Specification Questions

Specifications and design details as they affect both the engineer and the contractor brought considerable discussion. It was urged that new "specs" edition be issued with a program of acquainting both engineers and contractors with changes embodied. In one state, interested parties are called into a four-hour conference, in which changes and reasons for them are reviewed. Discussion from individual contractors is not allowed but channeled later through the contractor's association for a joint conference.

It was asked why differences need to exist over specifications. Specifications are generally revised every three years, and contractors are given a chance to meet with the department man and settle differences and questions. When unusually complicated design problems come up, advice on special provisions or design details is often sought for contractors in advance of final plans preparation.

A representative of PRA, Portland, Ore., said that his forces on forest highway work take contractors over the location in a group, a cooperation resulting often in better bids.

Estimate—Its Purpose?

Robert E. O'Connor, of J. C. O'Connor Const. Co., Fort Wayne, Ind., stirred up some controversy by stating that the engineer estimate's purpose should be to indicate the top price allowable, but is in no way a cost estimate. Referring to H. P. Gillette's handbook, he quoted that engineers are regarded as reliable in every respect except their ability to predict construction costs, and that an estimate should have no relationship to bids, past or future. Cost keeping is an engineering function within the contractor's organization and not a bookkeeping function, he continued. Costs are actually created on the drafting board and in the special provisions, but the engineer's estimate is often influenced by ideology, economic cycle changes, and other factors. Inadequate estimates today are often traceable to lack of ability to guess ahead on availability of materials, labor supply, and wages. The percentage to add to the job for management may need to be far beyond the customary 10%, and often should be 25 to 40% of the direct labor cost.

Lack of regularity in arrival of materials to a job was cited as one of the most serious factors in increased job cost today.

Illinois contractors let the highway department have access to their cost records, which are kept confidential, according to Chairman Hathaway. [Oregon also follows this practice.—Ed.] This access is considered important, since department observers placed out on a job for cost analysis often miss the intangible costs.

The Construction Committee also aired the subject of equipment rental charges, as they affect highway department and contractor work. Reference was made to the AGC lists last issued in 1941 with a supplement in 1943, and to AED's recent rate manual quoting recommended figures in some cases 50% over AGC rates. It was agreed that the whole subject needs national review, toward eventual issuance of new recommended rental rates for highway machinery. [AGC, AED and manufacturer representatives met on this subject in July—Ed.] Contractors confidently believe that lower costs will result from the new equipment designs now entering the field.

On the subject of coordinating the work of design and construction engineers, one state advised that design engineers are sent out with the district engineer to go over the job before preparing plans. Other states follow a similar procedure.

In another state a meeting is called to discuss preliminary plans, so that practical field needs will be properly incorporated. Tentative revisions are sent to the division construction engineer, who takes the special provisions and walks the job before final plans are issued.

In another state, special specifications are often made to take the place of details on the plans due to the organization's size and volume of work, resulting in some indecision.

Numerous other subjects taken up by the Construction Committee will not be touched on here due to space limitation. These included type of backfill and method of placement back of bridge and grade separation abutments; need for better hand tamping equipment for such work; differences in compaction control procedures in the various states; and the proposed Manual of Construction Practice on which much committee work has already been done.

Raises Luminaire Height

The blinding effect of glare caused by different mounting heights of highway lamps has been reduced as much as 90% by raising luminaires from 10 ft. to a standard of 25 ft. on stretches of New Jersey highways. The state was recently cited at the President's Highway Safety Conference for its lead in modernizing roadway lighting.

Mail Inserted Card or Inquiry Blank (page 131) for Equipment Data

Again this issue of Roads and Streets carries descriptions of many new labor-saving efficiency devices and latest material developments. See our New Equipment and Materials Section beginning on page 114, for which a numbered reply card has been inserted to help you request data on items that interest you. Also on page 131 is an inquiry blank and advertisers' index which will help you get data on equipment and materials you need.

JOB and EQUIPMENT IDEAS

Crane and Dozer on Tractor This County's Solution

The county commissioners of Imperial County, Calif., have a combination outfit that is a big help in their highway construction and maintenance. It consists of a crawler tractor on which is mounted both a bulldozer and a separately powered crane-dragline unit. This equipment is pictured here loading selected material with a dragline, after having previously done an efficient job of removing the overburden.

Engineering Work Progressing on Penn. Turnpike Extension

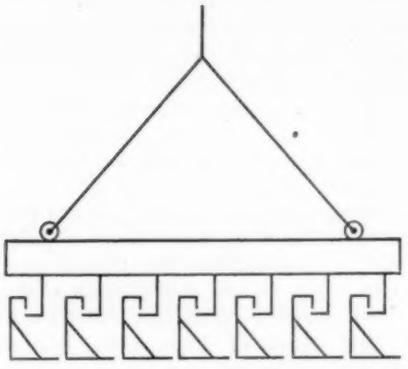
Progress is being made on the extension of the Pennsylvania Turnpike from Carlisle to Philadelphia, some 120 miles in length.

Since starting this work in June, 1947, Gannett Fleming Corddry and Carpenter, Inc., engineers, have laid out several routes which are under study by the Turnpike Commission.

Bids are now being asked for aerial topographical surveys of the entire route.

Lift Seven Form Sections at Time

Any device that will save time and labor in handling concrete road forms is welcomed by contractors these days. While traveling over Arute Bros. big 12-mile grading job southeast of Cazenovia, N. Y., the other day, we heard of a device used by this firm. It wasn't in action, so no snapshots. But here is a rough sketch of



one of the slings, which illustrates the general idea, which is to fashion a double sling which includes two parallel beams, spaced five or six feet apart. Under each beam is a row of seven hooks or L-shaped lifting bars. Forms are piled in rows of seven, then the sling is lowered, the hooks take hold under the roll of the form rail. The whole row is then picked up at once with the sling, using a truck crane or any kind of lifting device, and the forms swung on or off the truck or trailer. A successful idea, according to Jack Arute.

Home-Made Fine Grader

Field expedients ofttimes spell the difference between profit and loss on road construction operations, and the contractor capable of coming up with a "home-made" device to handle odd jobs is generally showing a profit.

Sather & Sons of Spokane, Washington, applied homespun inventive genius to the task of fine grading in the construction of 3.8 miles of U. S. Highway 10 between Coeur d'Alene and Post Falls, Idaho.

Its available Caterpillar grader was needed for sub-grading in the pioneering stages of construction. So for fine grading work in the absence of modern equipment now made for this purpose the company rigged up 24-in. timbers to form a fine-grading blade that fits between the forms of the highway, attaching the entire structure to a bulldozer frame of a D7 tractor.

Daytime Flashers an Important Safety Aid

Here is a state highway maintenance truck that flashes at oncoming motorists, day and night. You see it far down the road—can't "miss" it, and what's more important have no excuse to hit it, because the intense high-red lights flash steadily on and off at the rate of about once a second.

The state is Connecticut—Nation's No. 1 state in highway safety, by the way, where highway department maintenance employees set an excellent example to the motoring public. The road is the new Wilbur Cross Parkway near Hartford.

According to maintenance engineer A. L. Donnelly the pair of lights on high poles are special flashers for use on the divided Parkway; they flash only backward, since there's no oncoming traffic. Lights alternate in flashing. The rear flasher (arrow in photo) is a standard type used on 2 and 4-lane roads. This truck happened to have this light before the others were installed. The rear 2-way light is adjustable in height and flashes forward and rearward.

★ Flashers on poles are alternating one-way "winkers" that flash toward the rear only (for parkway use). Arrow points to standard 2-way flasher installed on trucks assigned to 2 or 4 lane undivided roadways

Suburban Housing Boom Creates Problems

The increasing tempo of private home construction along state highways, particularly in suburban areas adjacent to major cities, has resulted in a series of headaches for New York state highway maintenance crews according to Charles H. Sells, superintendent of public works. The difficulties arise from grading operations in which builders frequently fill in drainage ditches in front of the properties being developed.

New York state law prohibits private individuals from performing any work within rights-of-way without permits. Contractors frequently grade illegally up to the highway pavement. News dispatches from the d. of p.w. public relations bureau are publicizing the problem and telling citizens how to seek proper permits where seemingly justified.

•

Motor Vehicle Registration—The Public Roads Administration estimates the 1947 motor vehicle registration at 37,164,455. The previous record registration was 34,472,145 in 1941. Contributing importantly to the overall registration gains of 7.8% over 1941 are a 33.6% increase for trucks and a 43.5% increase for buses.

Here's Michigan's Tool for Cleaning Out Cross Joints

In response to several requests for methods of cleaning out joints, we again reproduce a photo of a special joint cleaner used in Michigan [originally in R & S Feb., 1945]. J. G. Schaub of the Michigan state highway department reports:

"This tool was designed and made by the Michigan state highway department, and as far as we know, it is not being made commercially or being used by anyone else. It is being very effectively used to clean out the bituminous joints in old concrete prior to capping with bituminous concrete. We also use it in cleaning out joints in old pavements in order to seal the joints with the new rubber asphalt compounds.

"For fair size projects, our costs have been running on an average of $25 per mile of 20-ft. pavement where the expansion joints are spaced 100 or 120 ft. apart. There is, without doubt, a great saving over the former hand methods, although we do not have any accurate costs for the hand methods."

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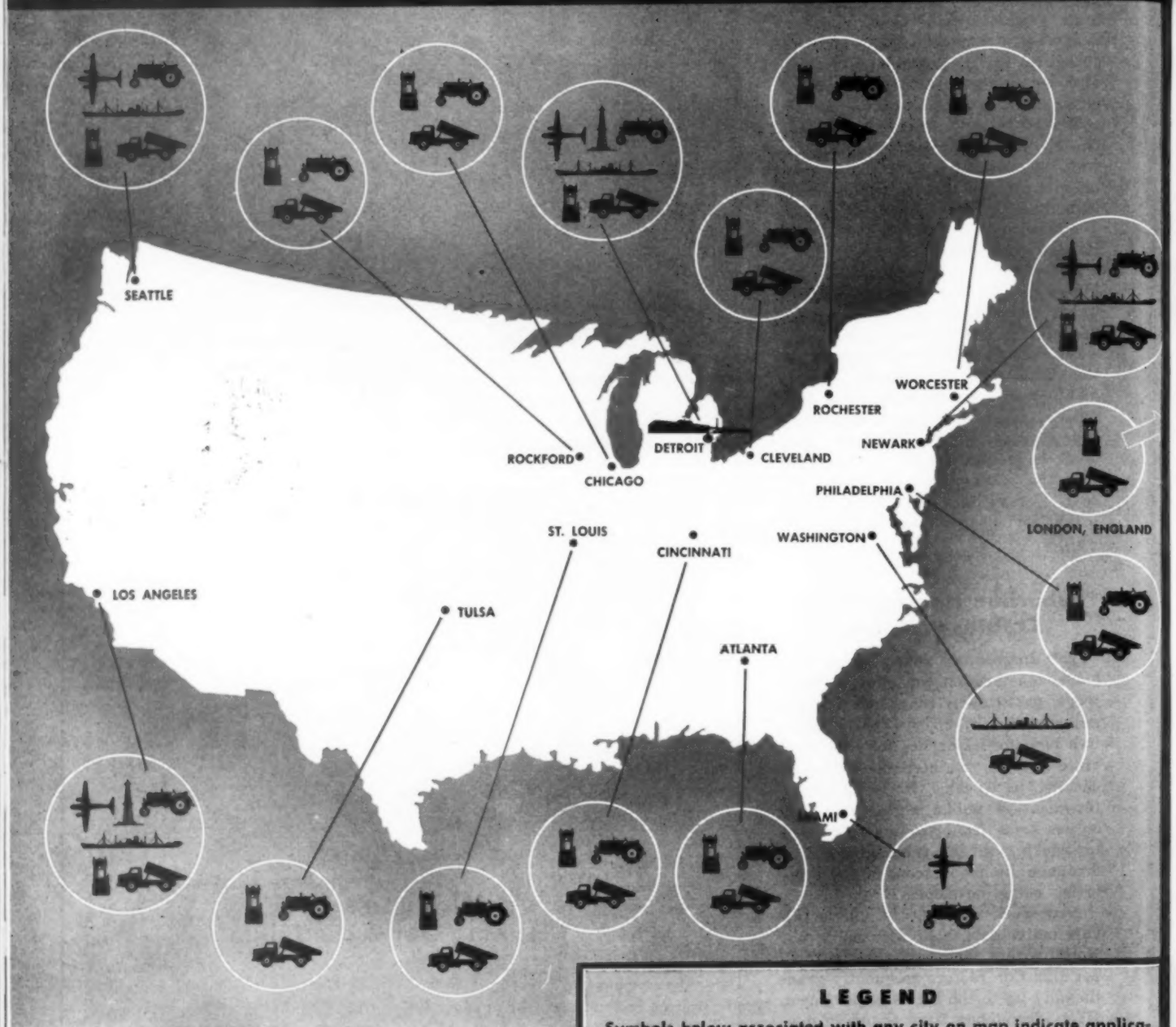

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LEGEND

Symbols below associated with any city on map indicate application engineering and service available at that office.

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- OIL WELL EQUIPMENT
- FARM MACHINERY
- AIRCRAFT
- MARINE

Rapid Moisture-Density Test

★ (1) Balance in use. Tare can on left pan; soil core in ring with lids on right pan

By F. A. Harris
Resident Engineer
Houston Urban Expressways
Texas Highway Department

LOCATION of the Urban Expressway projects in areas of heavy traffic, and unusually rainy weather conditions in the Houston area require all earth compaction work to be completed in relatively small units of work and in a minimum of time. Conventional methods using sand-backfill and rubber-balloon volume apparatus proved too cumbersome and time consuming; test results were seldom available in time to judge the density of a fill until after succeeding lifts had been placed. Moreover, their use, requiring trained laboratory technicians and transportation of personnel and apparatus to the many places where tests were desired, proved a major problem in itself. A large undisturbed sampling apparatus developed in this office for another purpose also proved too cumbersome and time-consuming.

The apparatus described herein has been used for several months on the Galveston-Houston Interurban Expressway project for checking sewer trench backfill, subgrade compaction and embankment compaction for pavement and bridge approaches. Its use by inspectors has reduced personnel requirements considerably, and has enabled them to check each lift before allowing contractor to proceed with the next lift. Field control has been more uniform than by conventional methods, due to the fact that more tests can be made and because the field test reveals over-compaction as well as under-compaction. The latter factor has reduced the contractor's work to the minimum required to meet project specifications.

Test Apparatus

The test equipment consists essentially of the soil sampler for securing a 62.5cc volume core of the fill to be tested (See drawing Fig. 1 and photo No. 2); a portable hand balance and pre-determined tare weight for weighing the sample against project specification density (see photo No. 1); 2-in. diameter aluminum lids and cellulose tape for sealing sample in ring when complete moisture-density-air voids test is desired; small digging and trimming tools (one Mason's pointing trowel and one steel spatula with 4-in. blade); fine emery cloth for cleaning rings; a small tin of petroleum jelly for greasing the rings before use; a US Army gas mask carrier for containing the apparatus. A set of brass weights is also provided where the inspector desires to know the exact amount of excess or deficiency of density of fill. Sufficient soil rings are provided to make 12 complete tests. Following is a detailed description of the soil sampler, balance weights and lids.

Soil Sampler

The soil sampler is shown on the drawing (Fig. 1). It consists essentially of an accurately constructed soil ring or mold containing 62.5 ccm. volume; a driving collar for holding

The apparatus described in this article provides a light hand-operated field apparatus for securing a small undisturbed core of known volume from the compacted earth to be tested, and for checking the core in the field to determine its density relative to the job specifications. (See drawing.) It was developed in the Houston Urban Expressways Laboratory to provide field inspection personnel with a simple, reliable and quick method of checking compaction of earth. (This method is obviously unsuitable for testing flexible bases or any earth compaction containing appreciable amount of aggregate.) In addition to the advantages of speed and lightness, the method is particularly valuable in that technically trained personnel are not required for its use and no calculations of any kind are required to determine compliance or non-compliance with job density specification. The entire field kit is contained in a small U. S. Army gas mask carrier, or similar container. A complete field test can be made in about 15 minutes by any man of ordinary intelligence.

the ring in place during sampling of the fill; and a driving handle for pushing or driving the ring into the earth.

The soil ring is a short section of 2" O.D. by 0.065-in. wall thickness cold-drawn seamless steel tubing cut on a lathe to 1 25/64 in. length, and with the outside lower edge sharpened to a 60° bevel. The sharpening can be done accurately and quickly on an ordinary valve-grinding machine. The dimensions of the tubing are very uniform and the length specified above gives rings each containing 61.5cc of inside volume; this volume simplifies calculations, since one gram weight of soil corresponds to one pound per cubic foot density for a specimen 62.5cc in volume.

The collar is a 2-in. section of the same size tubing provided with 3 lugs or prongs around the lower outside periphery to hold the ring in place, and two ⅜-in. holes near the top for attaching to the driving handle with a standard ⅜-in. bolt.

The driving handle is a 1-in. standard pipe tee with standard pipe connections to a 1¼-in. standard pipe coupling. The lower outside surface of the coupling is machined slightly to allow it to fit into the top of the driving collar, and two ⅜-in. holes are drilled to match the holes in the collar. The bolted connection is provided so that the assembly can be broken into small pieces for carrying; the bolt can be eliminated by welding the collar to the coupling, if desired, in which ease the assembly can be broken at the threaded connection between the coupling and the bushing. The 1-in. pipe tee fits nicely into the operator's hand, and is strong enough to stand considerable hammering on its top; when mushroomed or battered by hammering it can be unscrewed and replaced with a new tee.

Field Weighing Apparatus

The portable hand balance is shown in photo No. 1. It is a 100 gm. rated capacity balance and is sensitive to 0.1 gm., (corresponding to 0.1 lb/cf soil density for the 62.5cc volume sample) and has an actual capacity in excess of 200 gm. No technical skill or knowledge is required for its operation. Cost is about $2.00.

The specimen is weighed on this balance against a tare weight included in the kit. This tare weight is a seamless tin moisture-test can containing sufficient sand or lead shot to weigh the same as 62.5cc volume soil sample in its container at the specification density. One such can is prepared, sealed and properly marked for each soil type to be encountered.

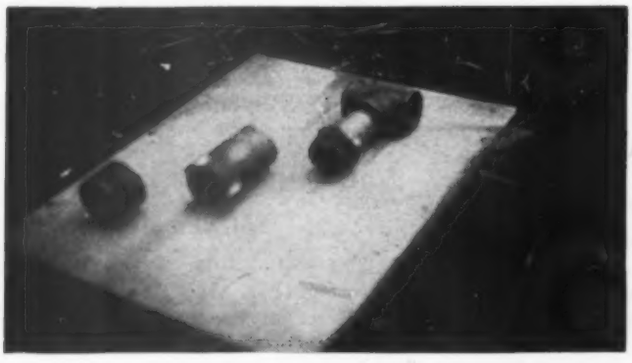
The 2-in. diameter aluminum lids are taken from aluminum moisture boxes such as commonly used in moisture tests in determination of soil constants. These lids fit over the outside diameter of the soil rings with a loose fit. Their weights are very uniform, and the weight of the two lids is included in the weight of the tare can described in the previous paragraph, so that the sample may be weighed with top and bottom surfaces protected by the lids. In case the aluminum lids are not available, the sample and ring may be sealed inside a seamless tin moisture can; these cans are also sufficiently uniform in weight to be accounted for in the weight of the tare can.

No other weights are required to check the wet density of the fill against job specifications. However, in case the inspector desires to determine the actual amount of density excess or deficiency in any test, a set of brass weights is provided. Such a set weighing from 1cg to 200 gm, and contained in a wooden block with hinged lid can be purchased at any laboratory supply firm for about $4.75.

Test Procedure

An area approximately 3 in. diameter on the surface of the earth to be tested is excavated to about 1 in. depth with the Mason's trowel or a shovel to remove crust and uneven surface (or to greater depth if it is

★ (2) Soil sampler. (3) Start on sampling operation. Driving collar and handle ready to be placed in position over ring in place on prepared surface

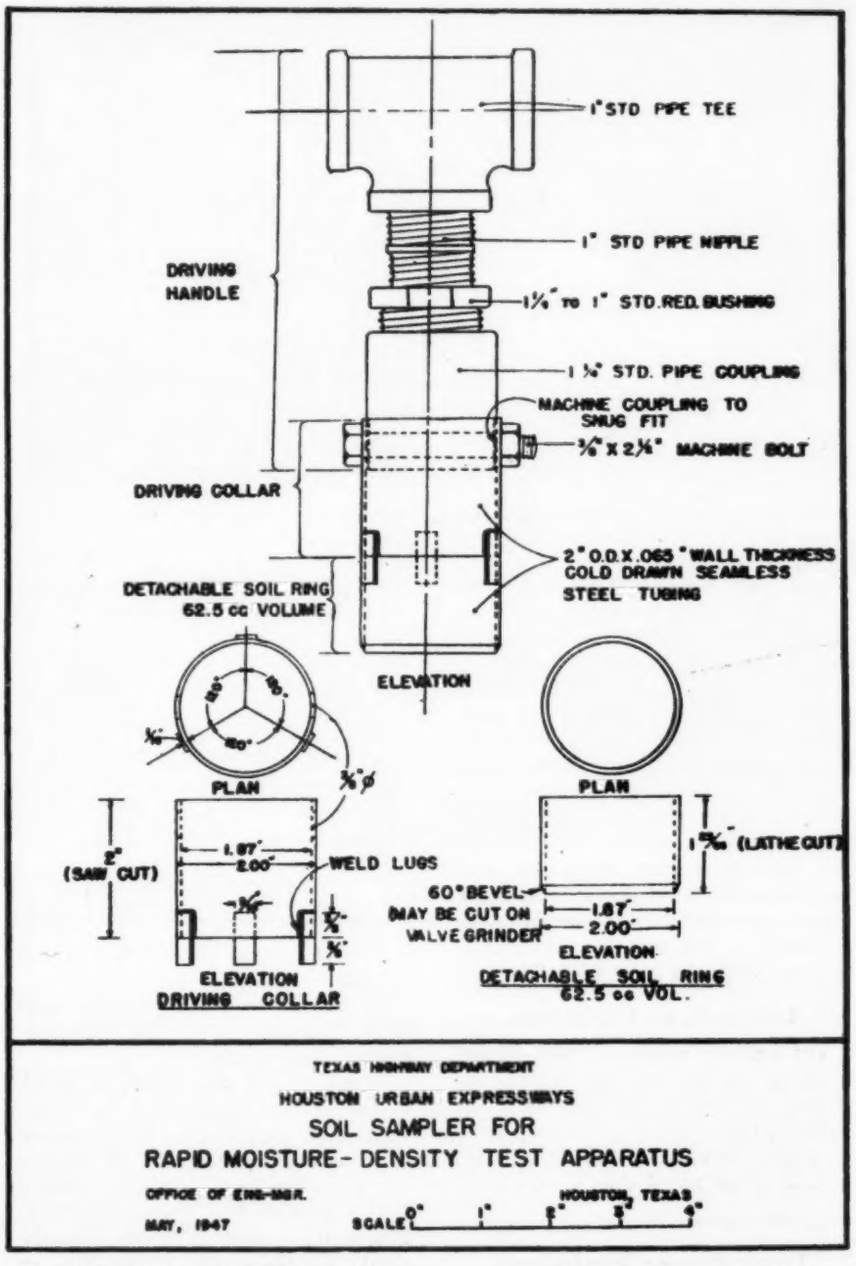


★ (4) Sampling operation. Ring driven below prepared surface of ground and partially excavated around sides

★ (5) Sampling operation. Ring and contents and surrounding soil being removed from ground

desired to check the bottom portion of a lift) and is smoothed off to a fairly plane surface. (Top surface does not have to be level). The soil ring is given a light coat of petroleum jelly to reduce friction during sampling and placed in position on the prepared surface. The driving collar and handle are placed in position and the ring pushed or driven into the fill in a direction perpendicular to the prepared surface until the top of the ring is ¼ in. or more below the ground. The driving collar and handle slips off the ring easily to allow inspection of the soil core in the ring. The ring with the sample and the soil surrounding the ring is then removed from the ground by excavating around the ring and lifting with the trowel from below. The excess soil is removed, the top and bottom surfaces of the core trimmed flush with the top and bottom edges of the ring and lids are placed over the ends of the ring. The 62.5cc volume sample in the ring with lids is placed on one pan of the hand balance and the proper tare can on the opposite pan. The balance is held in the hand as shown in photo No. 1. The specification wet density is indicated if the pointer of the balance is vertical; over compaction is indicated if the pointer swings toward the pan holding the sample, and vice versa. Photos Nos. 3, 4 and 5 show various steps in the sampling operation described above.

If the inspector desires to know the actual amount of under or over-compaction, small weights from the set of brass weights are added to the "light" side of the balance until the pointer is vertical. The weight in grams required to secure a balance equals the density excess or deficiency in pounds per cubic feet. If complete moisture-density-air voids test is desired, the inspector seals the lids to the ring with cellulose tape, marks the ring with the location and other identifying information and sends it to the field laboratory. Upon receipt at field laboratory the cellulose tape is removed, the sample and ring with lids is weighed wet, dried in oven in the usual manner and weighted dry. The wet density, dry density, percent moisture and percent air voids is calculated from these data.



★ Fig. 1. Details of soil sampler

Field Control

At the beginning of work on any particular job or site, several field tests are made on the first lift and each sample sent into the field laboratory for complete moisture-density-air voids test. Results of these first few tests are transmitted to inspector promptly in order to enable him to judge the moisture content of the soils concerned, and to establish a correlation between wet or total density and dry density. After a few days the inspector can estimate the moisture content within a few percent, and can control the moisture content visually within reasonable proximity to the optimum. In such a case the specification dry density will be correct if the wet density is correct, and the field test is used thereafter to check each lift, with only a minimum number of samples being sent to field laboratory for complete test data for job records.

In the event that it is impractical to adjust the rolling moisture on any lift to a condition near the optimum, consideration must be given to the effect of the excess or deficiency in moisture content on the dry density of the soil, since the field control is based on a field test of the wet, or total density. Results of the preliminary tests on the first few lifts will indicate the additional amount of wet density necessary to offset various amounts of excess moisture, and rolling will be continued until the field test indicates sufficient additional wet density to compensate therefor.

In case of a deficiency of rolling moisture, the practice is to require additional rolling and a resultant higher density such as will give an air-voids content equivalent to that at the specification dry density and moisture content. Here again the

★ Taking a soil sample on the Houston Urban Expressway work to check pneumatic tamped backfill around storm drain

preliminary tests furnish the inspector the test data necessary to compensate for the deficiency of moisture. In either case the small weights (1, 2, 5, and 10 gm) included in the set of brass weights are used to determine the amount of additional density required in the field test. In the case of personnel not technically trained, this information can be supplied to the inspector by the field laboratory technician and the inspector need know only how many grams additional weight must be added to the tare can to balance the sample in its ring with lids.

Test Data on Rapid Test

The uniform nature of field control attained by use of this method is clearly indicated by the data of Table I, representing job-record tests on sewer back-fill consisting of clay.

It is to be noted that a very uniform compacted fill was attained in this case, and that the average dry density was within 2 pounds per cubic foot of the specification requirement.

Acknowledgment

The writer is indebted to J. J. Dodson, Jr., resident engineer and F. M. Delk, senior resident engineer, for the original suggestion of a small undisturbed sampler for this purpose, and to Bill Hunter, District 12 Shop foreman, for construction and revision of several trial models of the soil sampler. All work concerned with the development of this apparatus was done under the supervision of J. C. Dingwall, urban designing engineer, and W. J. Van London, engineer-manager, Houston urban expressway, Texas highway department, Houston.

Table I—Typical Field Control Data

Test No.	Location	Depth	Wet (Total) Density Lb/cf	Dry Density Lb/cf	Percent Moisture	Percent Air Voids
109	2/25	3.0	125	104	20	6
110	0/70	3.0	129	106	22	1
111	0/15	2.0	128	109	18	4
112	0/80	1.5	132	108	21	1
113	1/20	4.0	128	106	20	5
114	1/92	4.0	132	110	17	5
115	1/78	3.0	132	110	17	5
116	2/20	4.0	129	107	20	4
117	0/40	2.6	130	109	20	6
118	1/30	3.2	130	106	23	1
119	1/50	4.2	126	104	21	6
Average Compacted Backfill			129	107	20	4
Specification Requirement			128	105	22	3

Long Range Highway Planning Wins Support in Nine Legislatures

Long-range highway planning won support in nine state legislatures during 1947 sessions. Highway studies have been ordered in Illinois, Kansas, Maine, Massachusetts, Minnesota, Nebraska, Oregon, South Dakota and Washington, according to National Highway users conference survey. In California authority apparently broad enough for a study was given an assembly interim committee.

Quasi-official studies are also under way in Michigan and under consideration in Mississippi, and in Pennsylvania an existing study group—the Joint State Government Commission—has been granted additional time by the legislature for making its report. The report is now due March 1, 1949.

In two other states, Florida and Ohio, legislation providing for long-range planning failed.

In six of the nine states in which higher studies were voted this year, legislative committees were created for the express purpose of making the investigations. Existing official bodies received the responsibility in Maine (the State Highway Commission), Massachusetts (Committee on Highway and Motor Vehicles), and Nebraska (the Nebraska Legislative Council).

In Minnesota, Oregon, South Dakota and Washington, personnel of the committees is limited to elected officials. The Kansas committee includes in addition to elected officials, eighteen members appointed by the Governor, including representatives of agriculture, highway users, labor and others. The number of committee members ranges from seven in Oregon and South Dakota to twenty-two in Kansas. Expenses of the studies are to be paid from state highway funds, with Washington making the largest appropriation of $100,000. In almost all cases the committee reports are to be made to the next regular session of the legislature.

Portland Cement Association Announces Training Course

Establishment of a training course in the fundamentals of concrete making and concrete construction practices for technical personnel of both the Portland Cement Association and its member companies is announced by Frank T. Sheets, President of the Association.

John A. Ruhling, veteran concrete man who has been manager of the Association's Housing and Cement Products Bureau since 1944, has been appointed Manager of Technical Personnel Training. The course to be conducted in 13-week periods is designed to enable new association staff men to serve the public more effectively, and develop faster into positions of greater responsibility.

The training course is part of a greatly expanded research, development and educational program recently announced by the Association. The objective is to continually improve the quality of construction using portland cement and to effect economies in time and use of materials.

New Horticultural Methods

Needed to Mechanize Landscaping and Roadside Work

By Nelson M. Wells

Principal Landscape Engineer, New York State Department of Public Works, Albany

HAND and horse methods of tilling land, cultivating crops and harvesting them have progressed but little from earliest recorded history. McCormick's invention of the harvesting machine marked the beginning of a new era in the use of power tools to aid in agricultural work, but it is only during the last couple of generations that the gasoline engine and the electric motor have been put to work on farming operations.

One of the recently invented land tools is a machine employing rapidly revolving teeth or prongs which stir up and mix together the surface layers of soil. It permits the admixture of soil amendments,. properly conditions a seed bed and does the work formerly accomplished with a hand hoe or rake. Extensive mowing operations on golf courses and airfields have encouraged the design of grass mowers which travel at high rates of speed and mow an acre of lawn in a matter of minutes. Such machines have been developed as the result of a challenge to cope with some laborious horticultural process.

New Mechanization Needed

Highway roadsides present another series of machine method problems. Limitations of space in which to work along a highway are not comparable with farm lands, golf courses and airfields. Furthermore, our highways go galloping over the hills and valleys and at their elbow are a series of cut and fill slopes. Some are as steep as one vertical to one horizontal. Some are 60 ft. high and even higher. The flat-land tools cannot ride these slopes. We are still pretty much in the hand rake era when bound in by these limitations.

The cycle of highway building is on the upward trend, however, and the development and care of highway roadsides is today a well recognized part of a modern highway program. The time is ripe for ingenious machine inventors to come forward with mechanized tools for the agricultural and horticultural processes in this specialized field of work.

★ Floss rig having 500-gal. tank with agitator and pump, mounted on trailer, being used to distribute fertilizer and grass seed carried by water pressure at a fraction of the cost of manual methods. This slope is about 1 on 1½ and 100 ft. high

A limited progress is evident but sporadic. Here and there across the states a few enterprising individuals have devised some new tools. They are rightfully proud of their achievements and have given them good publicity for the benefit of others. A few of such inventions have been adapted to roadside conditions in New York State and one of these is the "floss rig."

This machine is a homemade contrivance which looks like the apparatus for spraying insecticides on trees. Instead of using insecticide, however, the tank contains water into which is placed lime and fertilizers either dissolved or in suspension, and grass seed mixtures, all in measured amounts. These are carried under force by the water through a hose and onto the land.

Floss Rig Described

One machine of this type now in use in New York State is eminently satisfactory. It carries a 500-gal. wooden tank with an agitator operated by a small gasoline motor. A 100 g.p.m. centrifugal pump forces the water and its burden through a 2-in. feed hose and a 1½-in. or 2-in. delivery hose, with a ½-in. orifice nozzle, to a distance up to 100 ft. on the horizontal or 60 ft. on a slope of 1½:1.

One pass down a highway pavement using one truck driver and one operator can thus fertilize and seed even the most inaccessible spots cov-

This author while noting advance in methods of seeding, mulching, planting and other roadside work, calls upon manufacturers and contractors to devise entirely new equipment and labor saving procedures. Expressways and parkways aren't the only place this need is in evidence.

Ordinary rural highways present a huge need for fast, economical techniques. Lower maintenance, not just beautification, is the stake.—Editor.

★ (Upper left). Floss rig tank and pump assembly

★ (Upper right): Several hundred feet of delivery hose being used on floss rig. This seeding method minimizes the cost of distributing and placing materials, and greatly reduces the amount of walking on the slope by workmen

★ (Lower left): A north facing slope is gravelly soil on which very little natural growth had come in over a period of several years. Picture taken May 13, 1946

★ (Lower right): Same slope Sept. 4, 1946, showing four months' growth of grass seed and fertilizer was applied with floss rig. The overhanging "lip" of soil was cut and spread on the face of the slope. Workmen walked along the slope on contours, to form minor shelves and help hold a mulch of duck manure spread after seeding

ering 10,000 sq. ft. to the load in a very short period of time.

Another adaptation of this principle of quickly spreading fertilizer and seed is by use of a mudjack. Still another is by using wind pressure in place of water pressure. This latter machine is nothing more than an ensilage blower or a hay blower which will not only distribute lime, fertilizers and grass seeds for distances up to 40 ft. or more but will blow out hay or straw for mulching materials and also dustings of soil if desired to pin down or hold the mulch in place.

★ A sanding machine being used to spread a thin layer of topsoil to hold down a straw mulch on a newly seeded highway shoulder

Other Units Needed

Such adaptations of present machinery is obviously primitive. Cauliflower and cabbage planters are adapted to planting sprigs or clumps of living grass in the soil. Sand spreaders will quickly lay a ¼ to ½ in. layer of soil over a mulch to hold it down. Mowers in gang formation will cut about a 20-ft. swath of grass. Disc cultivators and sheepsfoot rollers will wedge a mulch of straw into the soil to protect erosion and benefit seedlings. But again, such tools cannot always be used on the steeper grades.

This situation is a challenge to the manufacturers of farming tools and the engineers in the contracting profession. The volume of work ahead is enormous. The highway construction and reconstruction program in

(*Continued on page* 113)

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★ Dayton, like many other cities, is still ripping up old street car tracks and paving the center zones. This is North Jefferson St., where city forces using a 1-yd. shovel ripped up rail and dug out old macadam base, aided by a large compresser and pavement breakers. Ready-mix concrete resurface, with paper cure

More City Paving Notes

Portland, Ore.—From City Engineer Ben S. Morrow we learn that Portland is well along on a $1,100,000 arterial street construction program in conjunction with the state highway department. This work includes several cloverleafs and overpasses, and a tunnel under Southwest Boulevard to cost $800,000. Sixteen miles of street resurfacing at $200,000 is programmed, and 80 miles of street graveling and oiling began in June, at $80,000. Also, during the first five months of 1947, 23 street improvement contracts were let and 56 more approved, to cost $435,000.

Cincinnati—H. H. Kranz, city engineer, reports: legislation is under way or completed on $1,500,000 in street improvements involving assessments, 5 of 15 parcels having been let up to June. Another $800,000 in projects "plans under way," $148,000 in car track paving repairs contemplated, $2,758,000 budgeted for property purchase, and another $2,500,000 in supplementary projects under consideration. Over $3,000,000 in grade crossings and other traffic structures programmed.

Of special interest is an item of $105,000 for topographical surveys, involving a triangulation network now being established by U.S.C.&G.S. and city forces. Work is also under way on plans, drilling, property acquisition and R/W details for the Blue Ash airport. Including sewers, dams, flood protection, etc. (see table), Cincinnati's total public works program for 1947 is over $19,000,000.

Connellsville, Pa.—Typical of the more modest but nevertheless vitally important work being pushed this year in smaller cities, is that reported by City Engineer J. E. Hoenshel of this municipality: 3500 sq. yd. bituminous alley resurface; 11,600 sq. yd. new street surface (black top on crushed slag base); 8200 ft. concrete curb; 1200 ft. sanitary sewer; cleaning 3000 ft. 24-in. sanitary sewer; grading of several streets and alleys.

Portland, Maine—$100,000 bituminous concrete resurface and $75,000 seal coating, reports Commr. of P. W. George H. May.

Jacksonville, Florida.—"Temporary hardsurfacing" is the way City Engineer W. E. Sheddan describes the type of improvement being placed this year on residential streets. He says, "This construction is what most cities would term as 'low cost' paving and consists of a light base built with local materials such as oyster shell, primed and given about 40 lb. slag and the necessary asphalt to hold it in place." About 32 miles planned, plus 10 miles of curb and gutter and 15½ miles of walks.

N. Y. State Honors 25-Year Men

More than 500 employees of the New York State Department of Public Works are wearing emblems denoting completion of at least 25 years' department service, reports superintendent Charles H. Sells. About 100 former employees who had served 25 years before retirement were also given pins. Presentation of pins and certificates were made in ceremonies conducted by the various divisions and district offices.

Projects	Est. Total Cost	Est. Property Cost	Est. Constr. Cost	Est. Assessed Portion	Est. City Portion
Highway improvements	$ 4,423,500	$2,721,300	$ 1,702,200	$ 400,900	$ 4,022,600
Grade crossing eliminations improvements	764,000	224,000	540,000	350,000	414,000
Structures improvements	3,343,000	436,000	2,907,000	—0—	3,343,000
General engineering improvements	425,000	—0—	425,000	—0—	425,000
Sewer improvements	3,494,000	62,000	3,432,000	886,500	2,607,500
Sewage disposal improvements	1,810,000	—0—	1,810,000	—0—	1,810,000
Flood protection (sewers) improvements	1,300,000	10,000	1,290,000	—0—	1,300,000
Grand totals—1947 program	$15,559,500	$3,453,300	$12,106,200	$1,637,400	$13,922,100
Supplementary highway improvements	3,457,700	518,600	2,939,100	428,500	3,029,200
Total	$19,017,200	$3,971,900	$15,045,300	$2,065,900	$16,951,300

★ City of Cincinnati, Division of Engineering, entire 1947 Improvement Program

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Lower Snow Removal Cost

Permits Extended Operations

WITH a new idea for handling and storing rock salt that the city has just adopted, Newark expected to approximately double its snow removal operations this past winter, keeping many more miles of streets free of snow and ice at no extra cost to the city, according to Ralph A. Villani, Director of Parks and Public Property. John S. Flockhart, Engineer in Charge of the Bureau of Street Cleaning, put the plan in operation.

In the past, the rock salt used on 20 miles of city streets had been kept in 100-lb. bags in a storage shed at the municipal garage. Because of the set-up there, it was necessary to haul the bags from the railroad siding, carry them inside, and bring them out again to load on trucks during snow and sleet storms.

The new plan called for buying rock salt loose instead of in bags and storing it in the open beside the rail siding at another garage. The salt was shipped in gondola cars, and a crane with a clamshell bucket having a capacity of 800 to 1,000 lb. was used to unload the cars and pile the rock salt beside the tracks for future use. Because of the large capacity of the clamshell, unloading time was considerably reduced.

In addition to the time saved in this operation, when the new plan was tried out during a recent storm, it was found that a great deal more time could be saved in loading rock salt into the distributing trucks. A snow loader was used for this operation and Mr. Flockhart reports that it took one man only 7 minutes to load a truck. In the past when bag salt was used it took 10 men 21 minutes to do the same job—a 96% saving of time and labor.

Because the new plan of operation makes possible such a considerable saving of time and expense, plus a saving in the delivered cost of salt in bulk as compared to bags, Newark plans to do a more complete job of snow and ice removal on some streets than has been possible in the past. It also permits an increase in the number of streets that are kept clear and safe all winter long.

Explaining that Newark follows a program of "preventive snow removal, Mr. Flockhart said that the rock salt makes that possible. City trucks spread it on all main streets and all bridge approaches as soon as snow or freezing rain begins to fall, and, if the storm is of long duration they repeat the applications until all danger is past. Rock salt keeps the snow from packing or bonding with the pavement, and melts much of the snow as it falls.

In our experience, it is difficult to plow the snow on very wide streets, Mr. Flockhart said, pointing out that if Broad Street were plowed, not more than one or two plows could be used at a time. These seriously interfere with vehicular movements and, before the snow can be removed, it is either scattered or worn to a smooth sheet of ice under the wheels of traffic. The best way to keep the streets open and safe, to prevent tie-ups and reduce accidents, is to get rid of the snow and ice as it falls. This is even more important on bridge approaches, he said, where a safe, dry road surface is of paramount importance.

Mr. Flockhart pointed out that the amount of salt that is spread during each storm depends on the snowfall and the temperature. If the temperature is high a light application will often be enough to melt the snow and ice completely away. Even with the temperature as low as 10° rock salt rapidly turns falling snow into slush. This slush drains off into gutters, speeded by the "sluicing" effects of traffic grind.

★ Getting set for snow last winter in Newark. Storing of rock salt in the open made it possible to lower the cost of snow removal in the city and increase the miles of streets that are kept free of snow and ice

Rear Guard Needed on Plowing and Sanding Equipment

At this time of year the following statement issued last winter to Connecticut state highway employees sounds a timely safety warning.

"Backing accidents involving Connecticut department automotive equipment are on the increase—rising from 35 in 1945 to 41 in 1946. The outstanding weakness—careless inspection by the driver—is indicated in two sample cases cited herewith.

"In the first instance the time was dusk and the truck was plowing snow and sanding. Besides the driver there were two crew-men on the truck. At a road intersection the driver backed to permit a swing into the intersecting road. He stepped out on the running board to look back, saw only a following plow at some distance and returned to his seat to operate the vehicle. The two crew-men remained in the truck body. As he backed the driver heard a horn, stopped his truck and dismounted. He found that the rear of the truck had struck the front of a passenger car which appeared after his inspection of the road.

"It seems needless to remark that had one of the crew-men been detailed to the pavement as a signalman that the backing would have been free of accident. The crewman could then have halted both truck and passenger car in time.

"In the second accident a sand truck driver backed with only a brief prior look at the roadway. He hit the side of a parked car that was not visible from the driver's seat. He, too, had two crew-men aboard.

"It is bad when a state vehicle is about its business properly and becomes part of a collision. It is worse—inexcusably worse—when it is so operated as to cause or contribute to the accident."

Milwaukee's Rules for Snow Plowing

Regulations given to operators of municipal snowplowing equipment:

1. When plowing snow, all routes must be plowed as they are given to you on the plowing routes, unless orders are changed by the Street Sanitation supervisors.
2. All route cards must be returned to the service stations when completed.
3. When routes are completed, call the dispatcher's office from the field for further instructions.
4. Trucks will not leave assigned routes at any time, without permission from the supervisor.
5. When snow has reached a depth of about 2 inches and it continues to snow, truck drivers and trailer men must report to garages assigned to them and call the dispatcher's office. Failure to do so will be cause for layoff.
6. Sickness of yourself or immediate family will be the only excuse for not reporting for snowplow duty.
7. Complete cooperation with Bureau of Street Sanitation supervisors is demanded while plowing snow.
8. Failure to comply with any of the above rules and full cooperation with all concerned during snowplowing will be deemed sufficient cause for a layoff.
9. All truck drivers are instructed that if any requests are made to them to do plowing which is not according to their schedule, the truck driver shall politely inform the party to make his request to headquarters.
10. It is necessary to plow from curb to curb but on streets where there is only a small space or no space at all between curb and sidewalk, care must be exercised not to throw snow onto the sidewalk.

Dispatchers must inform district supervisors when additional equipment is sent into a district, district supervisors to relay this information to the field supervisor when they report. Truck drivers will lunch 4 hours after starting time. Lunch period shall not exceed ½ hour.

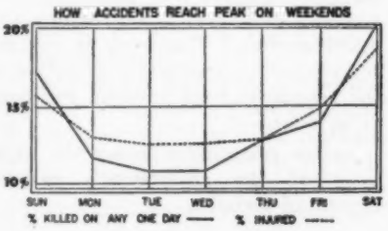
Each route sheet has the primary streets consisting of the fire runs, arterials and transportation lines on the first routes to be plowed. The residential streets are on a Secondary Route Sheet. As fast as plows become available from completed districts, the uncompleted districts are doubled up. All ward offices are kept open during a plowing to allow the field men the use of telephone service. Each street in the city is listed on the route sheets for snowplowing.

"Saturday Driver" Now the Trouble

"Saturday drivers" could be the new symbolic term for accident-prone automobile drivers if new accident statistics of one insurance company are correct, according to the National Highway Users' Conference.

These statistics showed that in 1946, for the first time in history, Saturday became the most dangerous day from the accident standpoint. Sunday dropped into second place.

Weekend driving continues to be the week's most hazardous. More than one-third of the total traffic casualties in 1946 of approximately 1,335,000 persons were killed or injured on weekends.



Wednesday—the middle of the week—was the safest day, with one-ninth of the average week's fatalities and one-eighth the injuries. Cautious drivers might take a tip from this and plan their long summer trips for midweek.

Much of the increase in motor vehicle mileage since the end of the war undoubtedly can be allocated to Saturday driving. Presumably this increase is due to pleasure driving resulting from a change in the work week from six to five days, now prevalent in business and industry.

The insurance company statistics showed that the most dangerous hour of the day from the standpoint of highway deaths is 7 to 8 in the evening. For injuries alone, the hour 5-6 p.m. stands out. Thus, 5 to 8 in the evening is the great danger period in traffic casualties for all days of the week.

Mail Inserted Card Or Inquiry Blank (page 131) for Equipment Data

Again this issue of Roads and Streets carries descriptions of many new labor-saving efficiency devices and latest material developments. See our New Equipment and Materials Section beginning on page 114, for which a numbered reply card has been inserted to help you request data on items that interest you. Also on page 131 is an inquiry blank and advertisers' index which will help you get data on equipment and materials you need.

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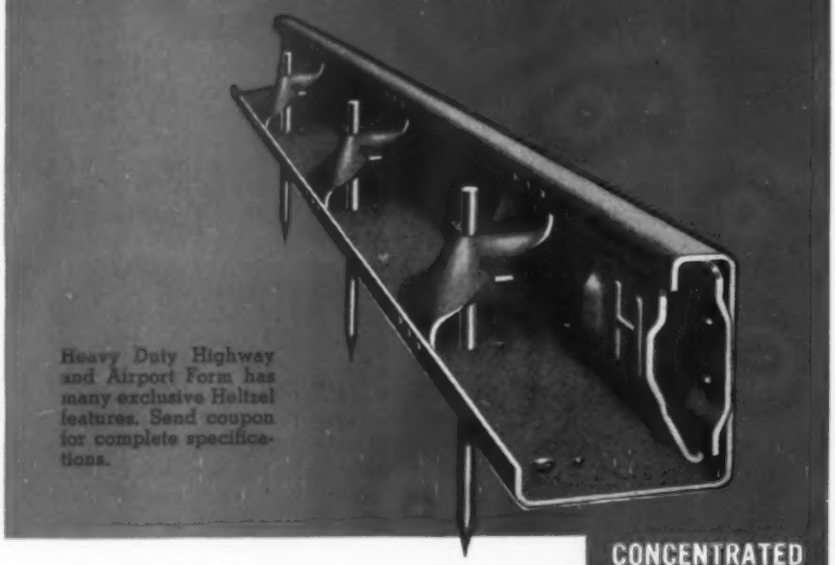

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(Type of construction usually engaged in)

HELTZEL STEEL FORM & IRON CO. WARREN, OHIO · U. S. A.

ARBA Technical Committees Active

By Charles M. Upham
Engineer-Director
American Road Builders' Association

Under the leadership of its general chairman, H. F. Clemmer, Engineer of Tests and Materials, District of Columbia, the American Road Builders' Association has moved rapidly ahead in its organization of technical committees. Forty committees are either organized or in process of organization with a total membership approximating 360.

Several reports were presented at the annual convention of the association in 1946. Organization work continued through the year and many of the new committees met at the annual convention in Chicago in 1947, either to outline future activity or to submit reports.

Regional meetings during recent months have been well attended. The Compaction of Soils committee under the chairmanship of Earl F. Bennett, Principal Soils Engineer, New York State Department of Public Works met recently in Buffalo. The Joint Committee of ARBA and the Highway Research Board on the Development of Highway Construction Equipment met in Boston in June.

This policy of holding regional meetings will be continued; next one, in the middle west in October, will be an open meeting of the Committee on the Development of Highway Construction Equipment under Chairmanship of H. F. Clemmer.

While several new subjects have been taken up for study since the war ended, most of the activity now under way is a resumption of prewar effort. Expansion of technical committee activity is based on the need for world-wide distribution of the modern technique of highway and airport design, construction and maintenance. Revolutionary changes in methods resulting from intensive research and the development of equipment necessitates continuous analysis of new practice and subsequent reporting.

Committees' purpose is to obtain information from every source, correlate it, and present findings which can be applied practically by the highway engineer, contractor and manufacturer. The work is not research, but is practical application of the science of road building resulting from research.

Active committees under the guidance of the association's general chairman include:

Alignment, Grade and Right of Way
Compaction of Soils
Contract System vs. Day Labor
Design of Rigid Type Pavements
Design of Flexible Type Pavements
Conservation of Highway Revenues
Elevated and Depressed Highways
Express Highways
Federal Aid Relationship Between States, Cities and Counties
Grade Separations—Railway and Highway
Highway Safety—Treatment of Icy Pavements—Snow Removal
Mass Transportation
Radio Communication for Highway Operation
Calcium Chloride Soil Stabilization
Cement—Soil Stabilization
Asphalt—Soil Stabilization
Tar—Soil Stabilization
Asphalt Emulsion Soil Stabilization
Weights and Sizes of Vehicles on Highways
Coordination of All Forms of Transportation
Earth Moving
Highway Terminals
Pan American Highway Award

In addition, the Educational Division has committees working on Highway Conferences and Short Courses, Visual Education, Construction Practice Education, Highway Engineering Curriculum and Student Chapters. The Municipal Division has committees working on Traffic, Property Assessment for Street Improvement, and Street and Railway Pavement Construction and Maintenance.

The Contractors' Division has committees working on Predetermination of Wages, Gross Weights on Highways and Uniform Reporting of Wage Data. The Airport Division has committees working on Airport Design, Construction and Maintenance. Under the direction of the County Division and American Institute of Local Highway Administration there are committees on Local Highway Administration, Public Relations, Standards and Legal Affairs. The American Road Builders' Association and the Highway Research Board have a joint committee working on the Development of Highway Construction Equipment.

New Louisiana Highway Director

R. B. Richardson

Robert B. Richardson, since 1940 construction and maintenance engineer of Louisiana Department of Highways, has been appointed acting director of the department, succeeding P. A. Frye, resigned. Mr. Richardson has been in the department of highways since 1924. He has been an instrument man, resident engineer, district engineer at Monroe, chief construction engineer and construction and maintenance engineer.

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the RIGHT POWER

TO MEET THE MOST EXACTING REQUIREMENTS

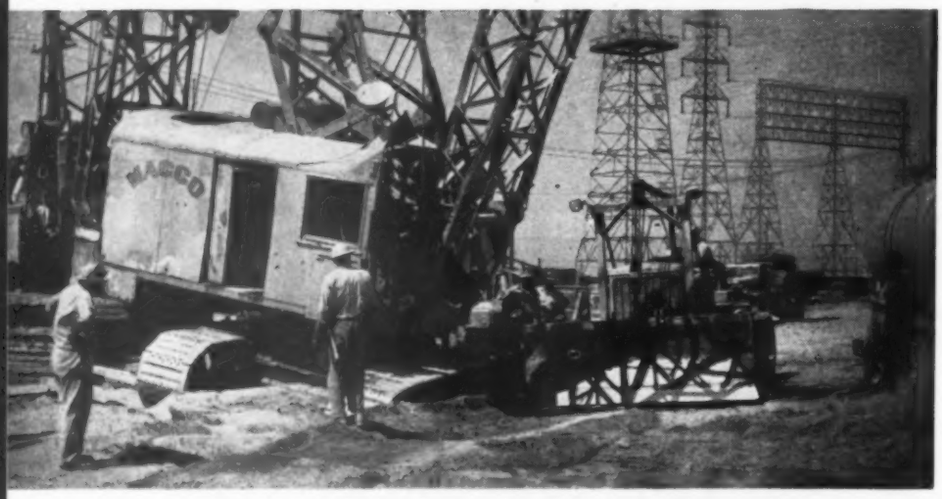
To users, dealers, and builders of gasoline powered equipment the world over, the trade-mark on a Briggs & Stratton engine is more than a label. It is a *seal of quality*—backed by the performance record of over 3 MILLION Briggs & Stratton engines during more than 28 years of *continuous production*. No other manufacturer has built so many 4-cycle air-cooled engines, or has had such long experience in building them. That's why the name BRIGGS & STRATTON stands for all that is best in meeting your most exacting power requirements.

Preferred Power FOR INDUSTRIAL CONSTRUCTION RAILROAD AND FARM EQUIPMENT

BRIGGS & STRATTON CORPORATION
Milwaukee 1, Wisconsin, U. S. A.

Rescue Job for Macco's Dragline

As snapped on the Los Angeles Terminal Island Freeway project of the Macco Construction Company



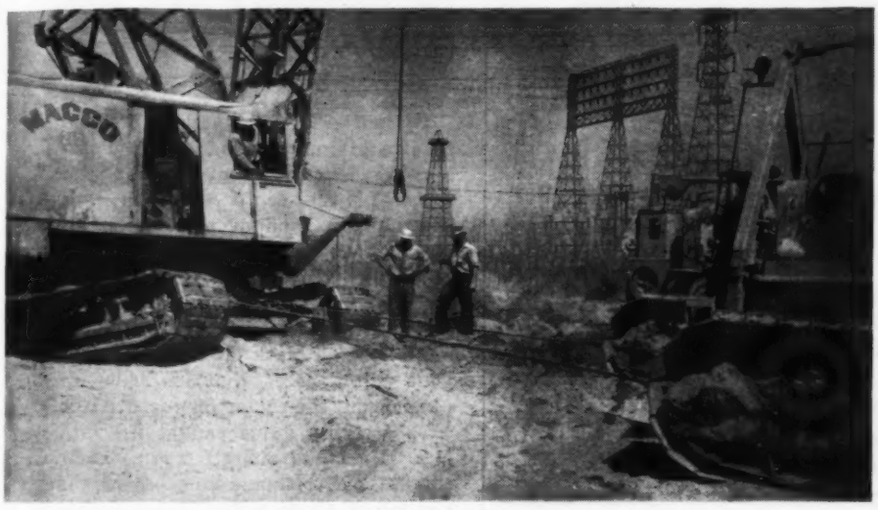
Well, well! Let a little hoist load like a 10,000-gal. water tank get a crane down? In good ground, not on your life! But in this soft, powdery alluvial soil, the operator really knew he needed mats, but took a chance

1 **What to do while the mats are arriving? Let's doze a trench in front and get at those tracks, which are full of dirt and excessively tight from efforts to climb out**

2 **Now the track has been spun a bit and has cleaned itself. No more danger there, so first we'll try to tow her out in this direction**

3 **Here she is, part of the way out, but still stuck. The corner nearest the camera is up a bit, however. Some progress. Now to see if it can be towed out in the other direction. A second dozer is helping on the other side of this one, but the two together still must give too hard a pull for safety. Might strain the undergear**

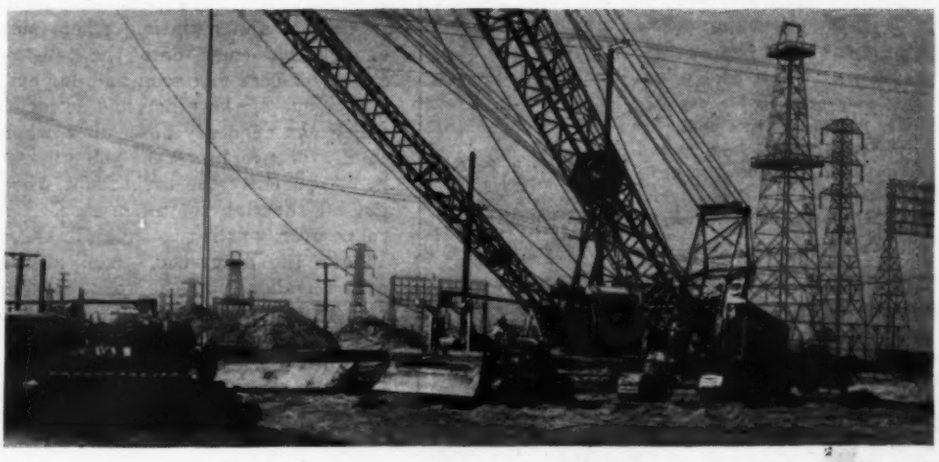
4 So, let's doze a trench in front of the tracks, and work the gal up on mats, as should have been done to begin with. Three passes of the dozer and the mat trench is ready



5 Now, another pull, again with two dozers. She's come part way out, and maybe now we can get a mat under her

6 Down with the mat, after which a dozer apron chocked it hard under the crawler toes

7 ★ The rest is easy. The operator brings the boom around in front of the tracks, lowers it a bit, and pulls the dragline up on her toes by reeving in his hoist line when hooked to the tractor as shown. A couple of hours lost, and now let's get to work. Pay to take chances now and then? A contractor crew without a bit of operating nerve and daring now and then is a bunch of dead guys



The REAL MEASURE of ENGINE VALUE is "H. P. HOURS" of POWER SERVICE

It isn't the original H.P. rating of an engine that counts but rather, the number of *H.P. Hours* of power service it will deliver during its lifetime. This, in the final analysis, is the real measure of *engine value*.

Wisconsin Air-Cooled Engines deliver the most H.P. Hours because they are designed and built for rugged, heavy-duty service. For example: every Wisconsin Engine, from the smallest to the largest, runs on Timken tapered roller bearings at both ends of the crankshaft to take up end-thrust and provide the best protection against bearing failure . . . at the same time assuring a smooth-running engine. This is just one typical detail that stands back of "Most H.P. Hours" of on-the-job power service.

You can't go wrong if you specify "Wisconsin Air-Cooled Engines" to meet your power requirements, within a 2 to 30 hp. power range.

Wisconsin Engines are available in a complete range of types and sizes (all 4-cycle) from 2 to 30 hp.

WISCONSIN MOTOR Corporation
MILWAUKEE 14, WISCONSIN
World's Largest Builders of Heavy Duty Air-Cooled Engines

The Weary Motorist

Missouri—This state's unusual scheme of guard striping "No Passing" zones consists of putting said stripe in the center of each lane around turns and over summits, instead of conventionally alongside the centerline. All of which is OK, usually, since the average out-of-state motorist soon gets the idea. But—on a certain dark and rainy night your editor noted that his habit of considering the center or guard stripe as a steering guide caught up with him. He found himself staying clear *outside* of this mid-lane stripe, if you get what we mean—outer wheels on the shoulder and a culvert headwell looming suddenly in the rain.

The lesson is that most motorists drive by a set of reflexes or unconscious habits. These habits make a fellow swerve and dodge and do things in emergency, quicker than the conscious will. Highways and all details of same must be so designed that the driver doesn't have to get too far from these habits too often.

Ontario—On Route 2 from Niagara Falls to Windsor recently, we drove along a heavily traveled concrete pavement. Pavement OK. But the shoulders (it had rained that day) were full of bird baths and ruts, and scores of miles of slab edges were exposed. We were personally worried about the situation, when, sure enough, we came onto the tell-tale cluster of cars and soon had our eyes full of one of those horrible accidents which can suddenly mess up a whole family of people. Yes, you guessed it. Apparently the car's front wheel got off the slab for an instant. Car rolled over, was it two times, or three. What's the difference. Ironically, a mile on ahead, by the road, stood a modern motor grader (Ontario highway dept.: this was about ten miles out of Windsor).

This stretch of busy road, like countless miles of roads in the most

of 48 states of the U.S., needs better shoulder maintenance in general and graveling or armoring in particular. Ontario socks motorists a big gas tax, by the way.

Massachusetts—A lovely state in summer, if we ever saw one, and swarming with vacation traffic. The hills are full of granite. So are the roadsides—granite block curbs just like you used to see described in the Highway Engineering Handbooks of 1905 or so. The Worcester Turnpike—a long stretch of otherwise fine 4-lane divided black-top—has murderous, rectangular cornered, razor edged granite curbs with old fashioned vertical faces along miles of inner lane edge, flanking the grassed center mall. What would happen in case of a slight swerve or a blowout is something to conjecture.

We are happy to see that some roads in Massachusetts have modern gutters, with sloping curb faces that you can drive up over without a wreck. A white paint stripe a foot or so out from the old sharp edged curbs has been provided as a warning and tacit admission of the danger, but these curbs ought to be modified, and fast.

Boston—We got lost three times, straying off U.S. 1 entering and traversing the city one night. The reflector beads on the signs are sooted and dirtied over. The signs are too small and poorly located to begin with—out of range of headlights. But why should we pick on Boston? Many cities are several laps behind the highway departments in signs and markers.

New York—An orchid to the D. of P. W., for what is undoubtedly the most thorough and all-around effective job of pavement marking of any state (California and a few others step forward and take an alternate Oscar). Their design, which is virtually the forthcoming AASHO standard, is quite effective. And the paint is everywhere *fresh and clear*. Is that too much to ask of arterials in all states?

New Mexico—As we passed through Santa Fe early this summer the local papers were carrying full page advertisements by the Chamber of Commerce on—guess what? Highways. Specifically, on the necessity of a north-south arterial highway that would help motorists get into, through and out of this jam-packed, overgrown little state capital. It seems that Santa Fe's citizenry are proud of their city's quaintness and atmosphere, and we agree that it has a charm and character gained from preservation of the old Spanish traditions — including its burro-width streets.

The state highway department, the PRA and others including city planning expert Harland Bartholomew, had agreed with the local planning commission on a route that would aid traffic and local business while preserving the city's atmosphere. The city council apparently has had other ideas.

Increased Construction of Public Works

By Halbert P. Gillette

THE *Monthly Labor Review* publishes the dollar "volume of construction work accomplished in continental United States" during each of the preceding 13 months. The monthly totals for each of 16 different classes of construction are given. Under Highways, for example, the July issue gives:

1946—	
June	$ 63,000,000
July	81,000,000
August	91,000,000
September	93,000,000
October	99,000,000
November	76,000,000
December	57,000,000
1947—	
January	37,000,000
February	34,000,000
March	48,000,000
April	75,000,000
May	100,000,000
June	125,000,000

These estimates do not relate to contracts awarded but to "work accomplished" each month, which explains the small totals of the winter months. The most significant figures are those for the comparable months of June, 1946 and June, 1947, the latter being double the former. This indicates that at last highway construction is beginning to "hit its stride," after the slow start resulting from disruption of normal public works activity during the war.

This disruptive effect was much greater in public than in private works, as indicated by the following totals in millions of "work accomplished."

	June, 1946	June, 1947
Private construction	$ 699	$ 788
Public construction	172	274

Although the June totals of private construction increased only 12% in a year, the June totals of public construction increased 70% in a year. The main reason why private construction reached its normal stride in 1946 is that, for the most part, houses, apartments and industrial buildings were not only urgently demanded as soon as the war ended, but much less time is required to prepare plans for such structures than for highways, water and sewage works.

Confirmation of this inference is found by comparing the 1939 and 1946 totals in millions of dollars:

	1939	1946
Private construction	$3,619	$7,739
Public construction	2,443	2,151

Since the cost of constructing similar buildings was nearly twice as great in 1946 as in 1939, it follows that the number of buildings constructed in 1946 was about the same as in 1936. But in spite of the great increase in unit-costs of public works in 1946, there was actually 12% less expended in 1946 than in 1939!

The item of State and Local Construction "includes water supply, sewage disposal, and miscellaneous public service enterprises." Here, too, we see the same slowness of recovery in 1946 from the disruption caused by the war, followed by rapid increase in 1947.

	Year 1939	Year 1946
State and local	$ 253	$ 281
	June, 1946	June, 1947
State and local	$ 25	$ 43

Here a 70% increase occurred between the last two Junes. If, as seems probable, the $43,000,000 spent in June, 1947, for water, sewage and other works, becomes the average monthly expenditure in 1948, still it would be only double that of 1939; or barely enough to cover increases in unit-costs.

Since there was a great curtailment of public works during the war, there is an enormous backlog of latent demand for such works. But latent demand must be converted into actual demand. In the highway field this can best be accomplished by increased "tolls" for the use of highways, hence by higher taxes on gasoline.

In the hydraulic field, bond issues, financed by higher charges for water and for sewerage, seem to offer the best solution of the problem. Very low interest rates on municipal bonds add to the attractiveness of this way of securing adequate, healthful service in the near future.

★ Examples of New Haven's well channelized street intersections

★ City-square channelizing at Paris, Texas

PRACTICAL SAFETY DESIGN IDEAS

Channelizing—We Need More of It!

Here are two excellent examples of the numerous channelized intersections to be seen at street intersections in New Haven, Conn. This city, like many other communities, has inherited from horse and buggy days numerous 5-way and other irregular intersections in which motorists would get lost without channelizing. Marking off of dead areas is part of the task, this being done either with portable or permanent posts conspicuously painted and striped.

Also shown is a somewhat unusual means of marking off left turn, right turn and go-straight lanes at each of the four corners of the city square of Paris, Texas. This channelization became necessary when the grassed square was cut back and pavement extended inward to provide parking space.

Left Turn Storage Lanes

Seemingly effective variation in left-turn storage lane design is shown on a Massachusetts divided highway. These turns and cross-over breaks in the dividing strip are for farm entrances and minor side roads.

Shoulder De Luxe

Seen also on the way from New York to Boston this past summer was this excellent stretch of bituminous paved shoulder—8 ft. wide for full turn-out in emergency, and sufficiently stabilized and armored to withstand frequent encroachment by the heavy traffic stream. While having the width of added outside lanes, the dark colored shoulders here are clearly recognized as shoulders and there seemed to be no doubt as to whether this road is still a 2-lane.

Pennsylvania Tries Reflectorizing

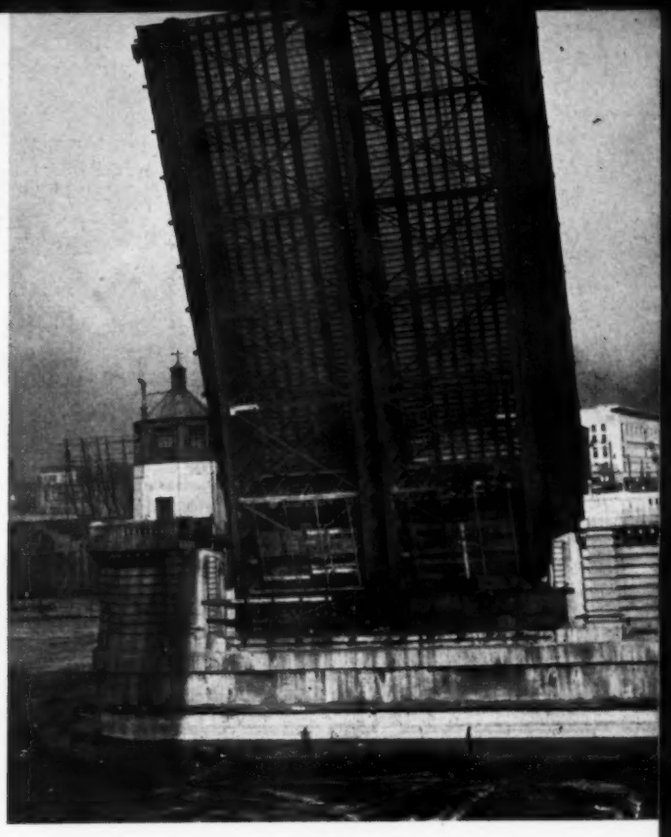
The Pennsylvania Department of Highways is planning to install reflectorized traffic signs on U. S. Routes 22 and 30, Ray F. Smock, secretary, has announced. The installation will be of an experimental nature to determine the cost and effectiveness. Reaction of motorists to the new type signs will be considered a contributing factor in determining whether the reflectorized signs will be placed along other routes.

All signs designating curves, grades, intersections, schools, crossings and other dangerous spots will be given a coating of reflectorized paint and glass beads. Recently the department completed the placing of reflectorized traffic line painting on these two routes for their entire distance in the state.

★ Excellent examples of left-turn facilities and shoulder construction seen in Massachusetts

Repairing a Bascule

How worn, broken track was replaced under veteran 200-ft. double-leaf lift span at Toledo



★ View of the west leaf in a raised position. Note temporary barricades and tarpaulins for protection of men

By Thomas W. Reeves

Commissioner of Harbors and Bridges, City of Toledo, Ohio

The Cherry Street highway bridge at Toledo, completed in 1914, is a concrete arch bridge spanning the Maumee River. It is 1194 ft. long, has a 52-ft. roadway and carries an average traffic load of 30,000 vehicles per day. Over the ship channel is a double-leaf "Scherzer" type bascule span with a 200-ft. clear opening through which an average of 4,000 vessels, carrying approximately 8,500,000 tons of shipping, pass during the navigation season.

Each leaf of the bascule span rolls upon 4 heavy cast steel tracks supported by structural steel girders imbedded in the concrete piers.

Tracks Worn, Cracked

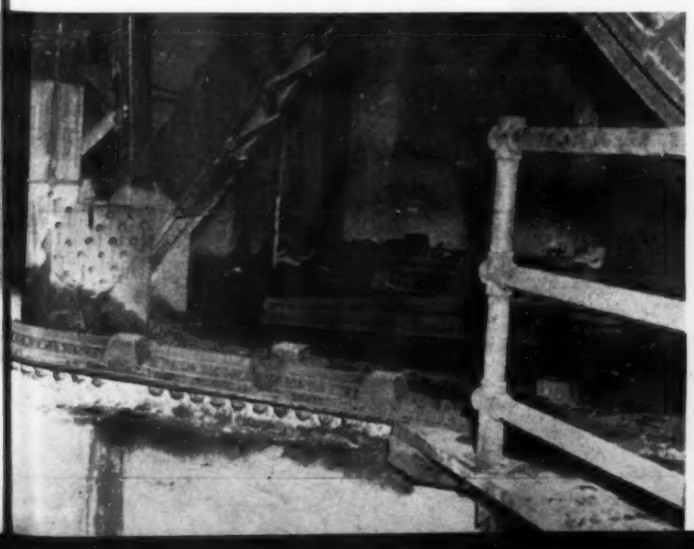
In 32 years this multi-ton span has rolled up and down more than a quarter of a million times which has caused an ironing out of the track plates that reduced their thickness by as much as ½ in. in some places, throwing additional stress into some of the operating mechanism. Longitudinal and transverse cracks had also developed in some of the tracks. This, no doubt, was the result of electrolysis, evidence of which was discovered several years ago.

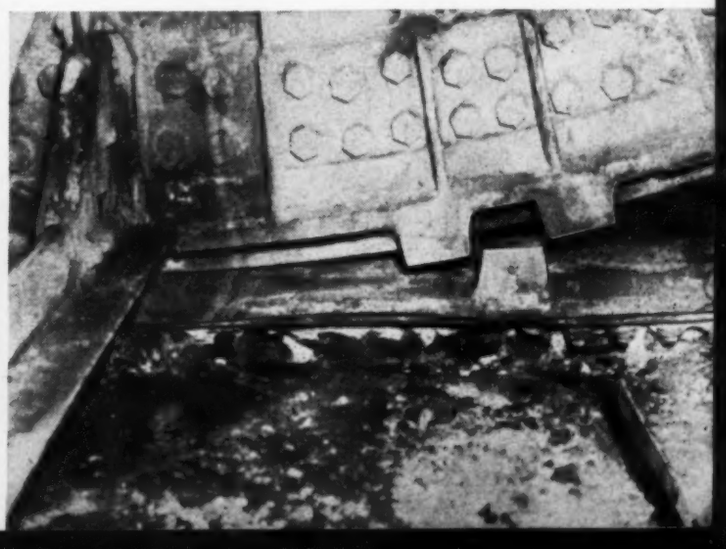
Replacement of the tracks, each of which are in two sections, was done in two operations. The bridge was first closed to navigation, the rear or shoreward section was removed and repairs made to the supporting girders, and the new track sections installed. The span was then put in an open position by rolling it onto the new rear section and the process repeated for the front section.

The entire job was completed within a 6-week period with the bridge out of service to the public only 17 days. Our own skilled maintenance mechanics performed the work, using our own equipment and tools at a cost of less than $15,000.

As can be seen from the photographs, the real problem was the restoration of the girders supporting the track. These girders are made of laminated steel plates with flange angles top and bottom. The part of the girder under the rear section of

★ Views showing old track in place before replacement work started. Concrete was removed in January, 1947





★ (Left): Condition of the track girders after removal of the old track and before any repair work was done —typical of condition found under all tracks. (Right): Showing broken flange angle, also location for diagonal bracket

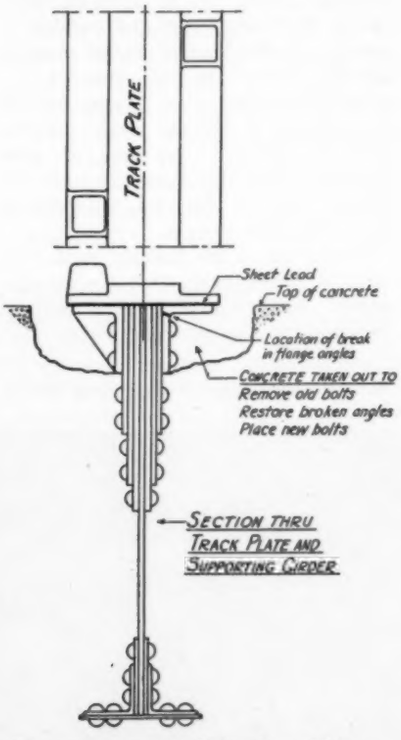
★ Part of one of the tracks that was cracked longitudinally. Note deterioration on bottom

★ New track in place. Sheet lead can be seen between track and girder, also diagonal bracket under lug

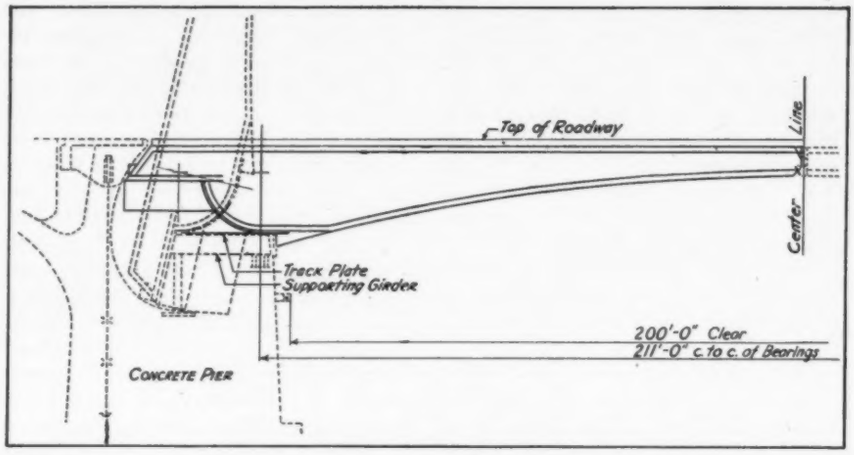
the track was in fair condition, only about half the length of the section; the part at the junction of the two sections had to be built up. That part of the girder under the front section had to be built up for its entire length and 90% of the flange angles had to be restored. It was necessary to add as much as ½ in. of welding in some places to bring it back level.

In restoring the flange angles, we found the vertical leg, which is riveted to the girder, in good condition. We therefore used a piece of steel plate for the horizontal leg and welded it in place without disturbing the verti-

★ Typical details of track repair



★ Lowering new track in place. Note figures on the rolling girder showing depth of welding required to level the track



★ Showing raised and lowered position, which permitted working respectively on the front and rear portions of the track

cal leg. Diagonal brackets of 1½-in. steel plate were also welded under the horizontal flange at the location of the lugs on the track.

Welding was put on in layers where necessary and well hammered after which it was ground with a portable grinder. A piece of sheet lead 3/64-in. thick was placed on the girder and the new track plate bolted in place preparatory to reaming. After reaming the holes from 1⅛ to 1 3/16-in., new turned bolts of 1 3/16-in. diameter were installed and the track pulled down to a firm bearing.

3 New Garages for Connecticut Highway Dep't

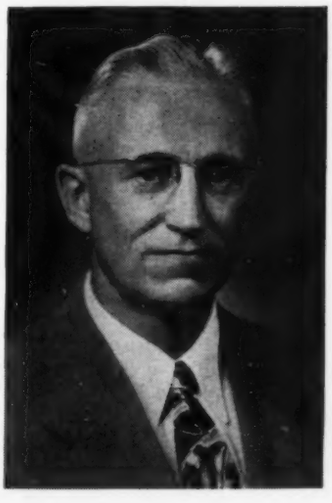
Construction of three new maintenance garages and alterations to two additional state owned buildings are under way or soon to be started by the Connecticut state highway department. Completion of these jobs will enable the department to get under cover about 25% of the trucks and other miscellaneous road equipment which have withstood the elements since 1946 for lack of inside storage facilities. Additional trucks now in rented garages will also be provided housing.

Largest structure is a two-story brick and concrete garage to be built on U. S. 1 in Norwalk. The building will be "L" shaped with a frontage of 207 ft. and a wing depth of 209 ft. Both sections will be 38 ft. in width. Approximately 29,000 sq. ft. of floor space will provide for the storage of 31 trucks as well as other appointments such as a stock room, machine shop, repair, carpenter, blacksmith and paint shops. In addition there will be an equipment steam-cleaning room, office, locker rooms and toilet facilities.

The second garage is to be 170 x 38 ft. Twelve stalls will provide for storing seven trucks and other equipment. The third is a 7-stall garage.

Asphalt Institute Establishes Springfield, Ill., Office

Bernard E. Gray, general manager of The Asphalt Institute, has announced the appointment of Herman C. Helmle, formerly with the Illinois Division of Highways, as district engineer in charge of a newly established Institute office at 520 South Sixth St., Springfield, Illinois.



The territory includes Illinois, Wisconsin, Minnesota, Iowa, Missouri, and Arkansas, part of the Institute's Division III. Mr. Inghram Grayson of Lion Oil Refining Company and a Vice President of the Institute heads the Management Committee for this division.

For the past 20 years Mr. Helmle has supervised the inspection of bituminous construction in the State of Illinois, his experience including not only laboratory investigations and designs but also equipment studies.

Progress in Protecting Highway Funds Made in 9 States

Forward steps in the protection of highway user funds have been taken in nine states during 1947 legislative sessions, the National Highway Users Conference discloses.

Nebraska ended the diversion of one cent of gas tax, henceforth to go to counties for improvement of rural mail routes.

A new Illinois statute prohibits diversion of highway funds to non-highway purposes.

The N. Carolina General Assembly, for the second consecutive time since 1931, balanced the general fund budget without resorting to the highway fund.

A Wisconsin bill to segregate all highway funds instead of only $36,000,000 annually has passed both Houses. Rumored Governor may veto with override.

Maryland and New Mexico have new legislation reducing diversion. Proceeds from Maryland's 2% certicate-of-title tax now go to motor vehicle rather than general fund. In New Mexico diversion of registration fees to the general fund has been reduced from 15% to 10% and allowance to counties for schools decreased from 25% to 15%.

Massachusetts and Tennessee legislatures approved anti-diversion amendment resolutions for the second time, thus providing for popular vote at next general elections. In Florida an anti-diversion amendment applying to only gasoline taxes was passed and now goes to the people.

Counterbalancing these gains were enactments in Rhode Island and Ohio which provide for potential diversions. Rhode Island increased the gasoline tax rate from 3 to 4 cents per gallon with the entire amount going to the general fund. A new Ohio law permits counties to use gasoline tax funds for construction and repair of sidewalks along county roads in congested areas. In Minnesota court action has been instituted to bar as a diversion a 1947 statute transferring $314,000 from highway funds to the general fund for gasoline tax collection costs.

•

First Federal Aid for Roads—The first appropriation of Congress for highways was for the Cumberland Road connecting the Ohio valley with the eastern seaboard. The funds over a period of 40 years totalled less than $7,000,000.

Radar Speed Meter to Aid Engineering Design

More accurate and reliable speed data obtained with a substantial saving in time is now a reality in Connecticut. The highway department there has acquired a new device for clocking car speeds. Known commercially as an Electro-Matic Speed Meter, the instrument, working on radar principles, measures car speeds with an accuracy of plus or minus two miles an hour throughout the range.

In the custody of the Traffic Engineering Section of the Connecticut Division of Highway Control, the speed meter is being used to accumulate information with respect to speed trends at critical locations throughout the state network of highways. The trends will be studies with relation to road widths, surfaces, alignments and frequency of vertical and horizontal curves. Speed observances will be made in existing zones to determine the necessity for change, if any, and to provide factual material for establishment of safe speeds on additional miles of highways.

The speed meter, a product of the Automatic Signal Division of Norwalk, utilizes a form of radar to pick up car speeds. It has distinct advantages over previous methods which used "electric eyes" or wires or tubes stretched across a highway to clock speeds. These devices required that the elapsed time between two points be obtained by stop-watch or by electronics. The speed was read from a conversion chart. With the modern meter these procedures are unnecessary.

The Electro-Matic Speed Meter is a precision instrument which measures car speeds instantaneously. For operating convenience the device has three components; a Transmitter-Receiver Unit, an Indicator-Amplifier Unit and a Power Unit. The "brains" of this assembly is contained in an innocent-looking black box measuring only 12" x 12" x 7". This unit contains the antenna and is plugged into the indicator unit which measures the speeds on a calibrated dial. The dial is illuminated for night reading. The indicator is, in turn, plugged into the power unit which is so constructed that it will operate on either 6-volt D.C. such as a car storage battery or 120, 60 cy., A.C. A fourth component, optional equipment but important for permanent recording, the Graphic Recorder automatically and continually records the car speeds shown on the indicator and operates synchronously with it. The entire assembly weighs only 45 lb. and can be operated by one person.

In operation, the transmitter-receiver may be set up about 10 ft. from the edge of the road and about three ft. above it. The antenna side is aimed at either the advancing or receding traffic and, with the switch turned on, the little black box goes to work squirting microwaves at the passing vehicles. The operating zone extends about 150 ft. from the receiver whose speed range is 0 to 100 or more m.p.h. The speed of each vehicle is recorded in ink on the moving paper tape in the graphic recorder in the form of a continuous graph.

The Connecticut Traffic Engineering Section feels that the efficiency of its efforts to increase safety on the highways will be immeasurably increased by use of the speed meter.

The instruments are also being used by the State Police with the same basic idea in mind, the prevention of accidents. However, the remedial measures applied by that department are slightly different from those of the highway department, as anyone who has been involved must admit.

Benefits Found in City-County Mergers

(Editorial from Forth Worth *Star-Telegram*)

Cities and counties, faced by rising costs but unable to compete with the federal government in the matter of taxation, are looking with increased energy for means of lowering their costs without impairing or abandoning services. The search for ways out of their financial difficulties, the American Municipal Association reports, is causing an increasing number of localities to study the possibility of consolidating city and county functions. These studies range from consolidation of one or more presently duplicated functions of city and county government to complete unification of both into a single system.

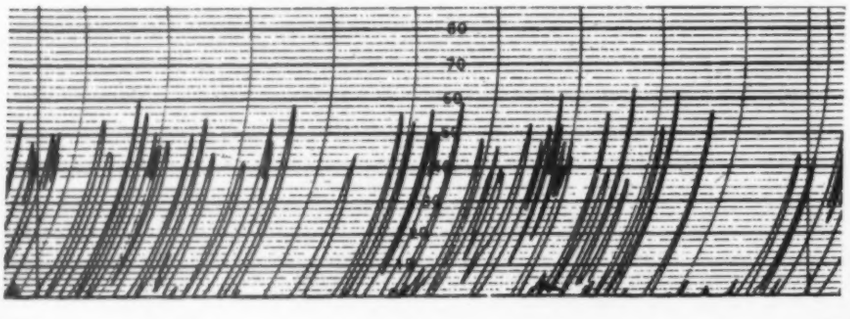
In Florida, the city commissioners of Miami have asked the State Legislature to "take all necessary steps" to bring about consolidation of Miami and Dade County into a single government. The feasibility of such a move is being explored also in Milwaukee, Atlanta, Birmingham, and Ogden, Utah. The general argument for the proposed mergers is that they would provide for orderly urban expansion and would equalize tax burdens and governmental services throughout metropolitan areas, which usually extend far beyond municipal borders. Economies are foreseen in elimination of duplication in such functions as law enforcement, health services, the collection of taxes, and the administration of public works.

Prominent examples of successful unification of city and county government are Philadelphia and New Orleans, but Denver long has stood as the most outstanding. The consolidation of the city and county of Denver took place in 1902, and there apparently is no yearning among residents of the area for return to the old system. As results of the consolidation, John A. Rush points out in his book, "The City-County Consolidated," that "taxes were materially reduced, dual sets of officers eliminated, conflict in authority obviated, and governmental operations simplified."

Some cities and counties have found that partial consolidation offers an answer to the need for making their expenses more nearly match their revenues. Other units of local government suffering a financial pinch might find their problems eased by following the same course. Cities and counties which do not want to go all the way on consolidation, or which are wary of unification proposals, might find the combination of some of their functions—such as health services—a means of testing the advantages or disadvantages of unification.

●

Virginia Proposes $20,000,000 Program—Virginia State Highway Commission has posted tentative allocations totaling $20,000,000 for construction on State's primary system of highways during the fiscal year 1948-49.



Rippers

How to Use 'em More Effectively

Contractors: A bit of analysis will help make more profitable use of this familiar tool. The following data and observations, while applying particularly to the equipment made by the author's company, should prove of value to owners of such equipment generally

By Installation Department, R. G. LeTourneau, Inc., Peoria, Ill.

MODERN rippers give safe low-cost breakage of a wide variety of hard materials, extend the working range of scrapers approximately 30%. Rightfully used, rippers can extend scraper operation into materials formerly considered strictly rock work . . . enable you to handle a lot of jobs with scrapers that would otherwise require trucks, shovels, compressors, drills, etc.

Breaking up hard-packed materials such as adobe, sunbaked clay, hardpan and other like materials for faster, easier scraper loading is probably the most common application of the ripper. Depth of penetration, number of teeth used and type of material determine the size of breakage. As a general rule, it is best practice always to dig the full depth of the teeth. This gives better fragmentation—larger pieces for best scraper loading. Use 3, 2 or 1 teeth, whichever number the tractor will pull through the material. For one-tooth operation always use the center tooth; when using two teeth, take out the center one.

Speeds Hardpan Loading

Chief reason for using ripper in hard-packed material is to speed up loading. If the material is really hard, it's easy to save ½ minute per scraper load. The table shows the estimated gain in yardage per hour when rooting reduces loading time ½ minute per load.

Shattering rock and shale frequently can be done with a ripper of sufficiently sturdy design, thus saving time-consuming drilling and blasting. The ripper breaks it up enough to permit scraper handling. A laminated or stratified rock structure will break under the wedging, penetrating forward travel of tractor and ripper. It is only necessary to get a start on any small projection, after which the teeth or tooth will enter and shatter material rightfully classified as solid rock.

Broken Concrete

Removal of concrete need no longer be a headache to contractors. In the past it has been a slow, inefficient and costly procedure. Now a ripper solves the problem with rapidity and economy. Naturally, speedy travel through concrete pavement is impossible, but progress is much faster than by most other methods. Two or three teeth may be used but the general procedure is to enter one tooth under the edge of the slab at right angles to its length. As soon as the tooth is sunk to its full depth at the edge against the slab, stop the tractor and use the lifting line. The slanting tooth pulled under the slab then raises vertically with more than the power of a small shovel and cracks the slab at the point of contact. Moving the tractor forward then completes the shattering and the ripper tooth is moved ahead again to meet a raw, unbroken edge. This is repeated across the slab, then back.

Other hard surfaces may be shattered in like manner. A scraper can load such broken concrete and transport it to waste areas with efficiency.

To remove black top, the first step is to make a series of trips lengthwise of the road with the ripper. If the black top is quite deep, it may be necessary then to root crosswise to get proper breakage for scraper loading.

Frozen ground is one of the most difficult materials to dig. Once penetrated it becomes easier to work and a ripper will break it sufficiently for subsequent removal with scraper rigs.

Land Clearing

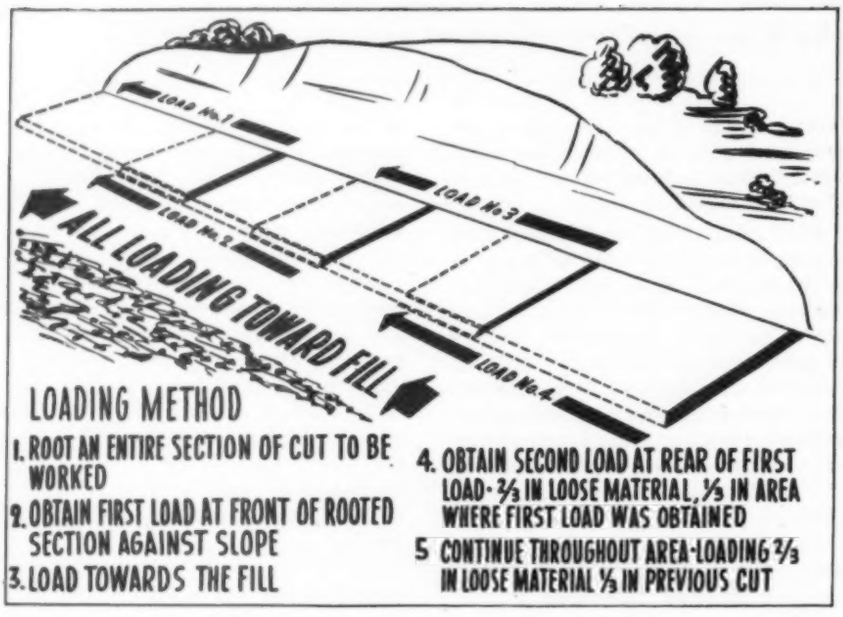
The ripper can be used to good advantage in land clearing where big trees or stumps are to be taken out. By breaking or pulling up horizontal root structures, these trees can be pulled out a lot easier. This should be done with 2 or 3 teeth to permit digging closer to the tree and to give more stability to the ripper. If big roots stop forward travel of the tractor, use the lifting leverage of the ripper to tear them up. Approximately 50,000 lb. pull may be exerted (Le Tourneau) by combining forward travel and lifting power. Few roots can offer this much resistance, so trees of enormous size can be taken out this way.

Clearing tangled root growth can be easily handled with a 3- or 5-tooth ripper. A 5-tooth unit is sometimes better — it gives closer raking furrows than when using 3 teeth. When the teeth become loaded with roots, pull the ripper out of the ground, drop the mass of roots, then windrow them with a dozer. You can do a better

YARDS GAINED PER HOUR

With	Tournapull	Tractor 100 HP or more		
Scraper Size: Heaped Measure	Super C 15-yd.	23-yd.	18-yd.	15-yd.
1-way haul:				
400 ft.	..	..	18	16
600 ft.	26	19	13	12
800 ft.	22	13	9	8
1000 ft.	19	10	7	6
1200 ft.	16	8	5	4
1500 ft.	14	6	4	2
2000 ft.	10	3	2	1
3000 ft.	7	2	..	..
4000 ft.	4	..	..	..
5000 ft.	2	..	..	..

★Breaking up concrete pavement with a ripper


LOAD No. 1
LOAD No. 2
LOAD No. 3
LOAD No. 4
ALL LOADING TOWARD FILL
LOADING METHOD
1. ROOT AN ENTIRE SECTION OF CUT TO BE WORKED
2. OBTAIN FIRST LOAD AT FRONT OF ROOTED SECTION AGAINST SLOPE
3. LOAD TOWARDS THE FILL
4. OBTAIN SECOND LOAD AT REAR OF FIRST LOAD - ⅔ IN LOOSE MATERIAL, ⅓ IN AREA WHERE FIRST LOAD WAS OBTAINED
5 CONTINUE THROUGHOUT AREA - LOADING ⅔ IN LOOSE MATERIAL ⅓ IN PREVIOUS CUT

★Chart showing five steps for step-loading scraper after rooting

job by working the area both ways, north and south on the first pass, then east and west.

Steep slopes are no hindrance to ripper operation. In fact, gravity from downhill operation increases tractor power and helps the ripper pull through material which would be impenetrable on level ground. You get better breakage and more work from the rig by reason of the downhill pull. Rooted material is naturally easier to handle, so you're able to greatly increase the loads of dirt or rock which may be dozed from a rooted slope.

How Ripper Aids Compaction

Here's how a ripper can be used to aid compaction: Earth structures generally require strictly regulated compaction. This is obtained by soil classification and the development of precise moisture control. Often watering the fill is difficult to control, and prewatering is a valuable aid in creating an even moisture control. Sink the ripper teeth to their full depth, water the resulting furrows and allow the water to stand until percolation and infiltration set up a moisture throughout the volume affected by the rooting.

Operating Suggestions

Good operators find the following suggestions helpful in obtaining maximum efficiency from rippers:

1. Do not root below grade. Most projects are governed by compaction requirements. Hence, if the material below grade is disturbed, compaction units may be required to restore the grade to a specific density.

2. Do not root outside of slope stakes. Working out of bounds is wasted work and time, and is a reflection of poor planning and management.

3. Always root close to slope, and work away from slope. This procedure enables scrapers to maintain proper slopes as the work progresses. It eliminates the necessity of going back to complete slopes by dozers or expensive hand work.

4. Plan to complete a given area to avoid congestion. This involves having a plan and carrying it out. Traffic control—since the advent of highspeed earth-moving units—is becoming more and more important. By working a ripper in a series of cuts and then moving scrapers from cut to cut the following day, equipment congestion can be avoided.

5. Repeat ripper pass if necessary to assure easy loading. If scrapers have difficulty in loading due to ineffective rooting, make a second pass. This will facilitate loading, and result in increased yardage delivery.

6. Step-load a scraper after rooting. Follow the 5 loading method steps as shown on the chart. The result will be bigger loads quicker. Ending the loading period in harder material (in the area where the previous load was obtained), forces more dirt into the bowl . . . does it faster.

Ripper-dozer combination makes an ideal outfit for removing dirt and rock in small, hard-to-get-at sections of a job. It often eliminates the need for slow, expensive hand labor when larger units can't be brought in. Wherever a ripper is used, a dozer can easily be carried on and operated from the same tractor. This increases ripper-tractor combination's effectiveness.

94 Million Diverted From Highways in 1946

Highways throughout the United States were deprived of $94,379,000 in highway funds garnered from various taxes that were diverted to other than highway purposes in 1946, according to the National Highway Users Conference.

The 1946 highway user tax dollars was spent like this: 56 cents for construction, maintenance and administration of state highways; 11 cents for state highway police, safety and service of state highway bonds; 27 cents for local roads and streets; and 6 cents for non-highway purposes.

Rhode Island diverted 47.68% of net funds distributed. Other states diverting over 15% were Florida 36%, Louisiana 25%, Texas 21%, Georgia and Nebraska 17%, Tennessee 16%. Largest in dollar amount of diversion were Texas with $19,442,000 and Florida with $17,998,000.

The 1946 diversions reported by PRA represent a continued downward trend in the use of highway user taxes for non-highway purposes, but since 1924 diversions aggregate $2,416,136,000.

Hard Facing

p-r-o-l-o-n-gs cutting edges

Useful facts from a manufacturer of hard facing rod

THE need for increased lifewear of iron and steel surfaces subjected to dry friction became apparent long ago, when it was learned that heat generated by such friction reduced surface hardness, causing the metal to wear away rapidly.

With the development of welding it was discovered that worn surfaces of iron and steel equipment could be built up economically with steel and kept in service a while longer instead of being discarded, yet the parts restored by welding wore away as rapidly as the original steel.

This led to experiments with hard alloys that could be applied by welding to wearing surfaces to provide resistance to abrasion at high red heat.

With the advent of heavier equipment, resistance to severe shock and impact also became essential. Today, a successful hard-facing alloy should have a high hardness and be able to retain this hardness at high temperatures. At the same time it must have enough ductility to withstand impact and weldability to form an unbreakable bond with the parent metal even with only slight penetration.

What Is Hard Facing?

It is the process of depositing a metallic compound or alloy to the wearing surface of softer metal part or tool in order to increase its wear-resistance. Worn parts can be restored to original dimension or contour in the hard-facing process, or to oversize dimension if desired. It can be applied by electric arc, carbon arc, or oxy-acetylene welding.

In some cases, an engineer when discussing hard-facing becomes very mysterious and technical in his explanation of the process. He endeavors to impress upon his listener the miraculous properties of his own particular hard-facing.

As a matter of fact, there is nothing really miraculous in any type of hard-facing material.

The object of this article is to endeavor to correlate and explain, in part, the general principles employed in the field of hard-facing.

★ This bucket, in the shop yard for repairs and tooth replacement, shows the value of hard facing. Note the hard facing beads along the lip between teeth and on the outer and inner side of the sidewall. Seen at headquarters shop of Morrison-Knudsen, Inc., Boise, Idaho

What Are the Types of Wear to Which a Part Is Subjected?

ABRASION is a grinding action caused by abrasive solids which slide, roll, or rub against wearing surfaces of equipment.

IMPACT is a repeated blow which wears or deforms wearing surfaces.

GALLING is the adhesion of two metal-bearing surfaces, followed by the tearing out of small fragments of one or the other surface.

CORROSION is the oxidation or other chemical action to which metallics are subjected by liquids, salts, heat, or gases.

EROSION is the scouring action of liquids, gases, or vapors moving at high velocities against the wearing surfaces of metal.

Hard Facing Can Be Divided Into Four Groups

(a) Ferrous alloy group, with less than 20% alloys and the remainder iron. The alloying elements consist usually of chromium, tungsten, manganese, nickel, silicon and carbon, with a hardness ranging from 35 to 15 Rockwell C scale. Many parts so treated are machinable or forgeable.

(b) Ferrous alloy group, with over 20% alloys and the remainder iron. The alloying elements usually include chromium, nickel, carbon, molybdenum, boron, silicon, and manganese. Some of these alloys will re-

★ Hard facing examples seen at the San Francisco airport operations of Macco Corporation. This company in carrying out its end of the Macco-Morrison-Knudsen 6,000,000 cu. yd. earthmoving contract, used over SIX TONS of hardfacing rods to fortify shovel dippers and teeth, tractor sprockets and other parts. Note that flange edges as well as bearing surfaces of sprockets are built up

tain their hardness at red heat, the deposited hardness ranging from 40 to 62 Rockwell C. Most of this group are not machinable.

(c) Non-ferrous alloy group, with very little or no iron, is comprised mainly of nickel, cobalt, chromium, tungsten and molybdenum. Combinations of this group are used for applications where corrosion, heat, or impact is necessary. (Example—high temperature steam valves, exhaust valves, hot work dies, part subject to corrosion.)

(d) Diamond-substitute group, composed of carbides of tungsten, tantalum, titanium, and boron; also borides of chromium. This group is the most resistant to abrasion of all hard-facing materials, but it does not compare with the ferrous alloy group in so far as withstanding impact and shock is concerned. The rough deposit of this group also limits its use.

What Type of Hard Facing Should Be Used on What?

In the construction, mining and rock products industries, the uses of hard facing are almost unlimited. Referring to the above mentioned groups, crusher jaws, dragline and dipper teeth, bulldozer blades, the cutting edge of scraper blades, etc., would require a Group A or B hard facing, since toughness is the primary requisite.

Valves, on the other hand, would require a Group C hard facing, because of high red-heat-hardness quality and corrosion resistance.

Rotary drilling bits and similar tools would require one of the Group D alloys because of the need for extreme hardness.

A Few Things to Know Before Hard Facing Anything

Deposits made with either oxy-acetylene or metallic arc process usually exhibit higher hardness properties than those made by carbon arc.

The metallic arc process is most satisfactory from the standpoint of speed of deposition.

Hard facing deposits for maximum hardness should be made using the longest acetylene cone in the flame that will produce a satisfactory deposit under the existing conditions.

The hardness of the deposit can be increased by hot peening while the metal is still red hot. (This applies to Group A Austenitic type only. An alloy that is deposited soft and hardened by working, impact or deformation.)

A carburizing flame in acetylene hard facing will melt the base metal more rapidly than a neutral or oxidizing flame.

With the exception of a very few, hard facing materials can be finished only by hot-knifing, hot-filing, or grinding. The correct speeds and types of wheels should be used to avoid grinding checks.

It is always good economy to use the largest diameter size rod suitable for the job. The thicknesses of the base metal and the desired deposit should determine the rod diameter. Generally speaking, if a ¼-in. electrode is used on sections less than ½-in. thick, the heat will cause excessive warpage and penetration. The use of 5/32 or 3/16-in. electrodes is recommended for sections between ¼ and ½ in. thickness, while ⅛ and 5/32-in. electrodes are advised for sections under ¼ in. thick. The ⅛ and 5/32-in. diameter rod can be used on very thick sections, but the work will progress more slowly.

The smaller rods are best to use whenever very thin deposits or narrow beads are required.

Most Steels Hard Faceable

The majority of steels are capable of being hard faced with the exception of certain high vanadium and high-speed tool steels.

Low and medium carbon steels: Steels with carbon up to 0.50% can be successfully hard faced with both acetylene and electric arc.

High carbon steel: Steel with over 0.50 carbon can be hard faced by either process. Preheating sometimes is necessary before application and heat treating afterward.

Low alloy steel: Either process may be used. Heat treatment is occasionally necessary.

Manganese steel: Electric arc process is recommended. (Crusher jaws, dredge cutter blades, etc.)

Stainless steel: Readily hard-faced with either electric or acetylene. (Includes high chromium and 18-8 chromium-nickel steels).

Cast iron: Both processes, with preheating advisable.

Cast alloy: Either process.

How It's Done with Acetylene

This method allows close control over the operation and produces a smooth deposit. Particles of scale and foreign matter are controlled more easily by this method, also edges or corners can be quickly formed.

It is important that all loose scale, rust or other foreign substances be removed from the area to be hard faced, preferably by grinding or machining. If these facilities are not available, a file or wire brush can be used, but this method often fails to remove scale or other matter, which must later be floated out during the hard facing operation.

Preheating is always advised in cases where application of hard facing might cause the part to warp. This can be done with a neutral oxy-acetylene flame or in a furnace. Whenever possible, the article to be hard faced, should be oven-heated to approximately 500° F. and maintained at that temperature throughout operation.

The necessity of using the correct type flame cannot be overemphasized. It is important to select a bulbous type tip which gives a soft flame with round inner cone. Use a tip larger than would be used for welding the same diameter steel rod.

The flame for hard facing should contain an excess of acetylene and should be adjusted so that the excess acetylene flare, or brush is about three times the length of the inner cone.

The surface oxides in the base metal must be reduced slowly before depositing the hard facing. If, however, too much acetylene is used, carbon will be deposited on the surface causing a scum. If insufficient is used, the oxides will not be reduced.

The first step consists of bringing the parent metal to a sweating temperature with the torch. The end of the hard facing rod is then brought into the flame and allowed to melt onto the sweating surface. DO NOT use the rod to stir or spread the material.

If any particles of rust or scale are encountered during the operation, be sure that they are floated to the surface. If they are allowed to remain and are covered by the deposit, blowholes or porosity will result.

If the base metal is cast iron, it will not sweat like steel. Hard facing, therefore, will not flow as readily on cast iron as on steel, and it is usually necessary to break the surface crust with the end of the rod. A little less acetylene should be used in the flame than for steel. Care must be taken not to melt the parent cast iron too deeply.

Cast iron is a rigid metal that will check or crack from shock. Heat should never be applied to cast iron faster than the body of the base metal will transmit it. The applied heat should cover the entire body evenly so that all sections of the base cast iron will expand equally; otherwise, it may crack. After hard-facing, the piece should be covered to permit equal surface heat transmission until it cools.

How It's Done with Electric Arc

The procedure should duplicate, as nearly as possible, the action and conditions encountered in a successful acetylene deposition. Experience has shown that the most practical and efficient method of deposition is through the use of a weaving bead.

As with acetylene, the surface should be thoroughly cleaned, and the part preheated to reduce structural stresses. Where oven or furnace preheating is impractical, the base metal should be kept as cool as possible. In such cases, the application can best be done by skip welding.

Reverse polarity is recommended if DC current is used and it is advisable to hold the electrode at a 45 degree angle. Although the arc will jump straight down from the point of the electrode, the arc "blow" will direct the heat back over the deposited hard facing in much the same manner as the brush of acetylene flame.

A medium arc is advised to prevent deep penetration of the parent metal, which causes local upsetting and the setting up of stresses. When a short arc is used the heat is confined to a smaller area, hence goes deeper, results in too great a mixing of the parent metal with the deposit. Dilution will reduce the hardness of the overlayed hard facing. Where possible, arc from the deposit rather than the parent metal.

Wire Rope Maintenance

Condensed from Catalog G-15, MacWhyte Company, Kenosha, Wisconsin

IN A SENSE a new piece of wire rope is just like a new automobile. If a new automoble is not properly lubricated, if the stiff new parts are not given a proper breaking period before the throttle is pressed to the floor, the car is soon worthless.

In the same way the life of a piece of wire rope can be shortened or immeasurably lengthened. Proper care and lubrication of new wire rope and the observance of a few practice-proven rules will save many dollars that otherwise would go for the purchase of new wire rope.

Safety Factor Means Additional Life—With a high factor of safety the pressure per square inch between rope and sheave or drum is less, thereby reducing the rate of wear. Wire rope with a safety factor of 6 will last approximately twice as long as the same rope operating with a safety factor of 3.

The safety factor of a rope is the number of times the rope is stronger than the load it is expected to lift. Engineers explain it as "the ratio between the rated breaking strength of

the rope and the load applied to the rope."

Thus if a crane with a single part line is equipped with a rope having a breaking strength of 12 tons to lift a load weighing two tons, the safety factor of the rope is 6.

If the same rope were required to handle a three-ton load, the safety factor would then be only 4, too low for safe, economical operation. The ability of wire rope to withstand bending or fatigue decreases rapidly when loaded too heavily. This is one of the greatest causes of rope failure.

In addition, a high initial safety factor in the rope means that after its strength is reduced by wear or broken wires that a greater reserve strength remains; more protection against accidents to men and machinery.

Reverse Bends Reduce Rope Life—Years of experience and many tests have proved that reverse bending and excessive wire fatigue reduces rope life as much as 50%.

There are instances where reverse bending cannot be eliminated. In such cases, the largest sheaves possible should be used and they should be placed as far apart as possible. By getting the maximum distance between reverse bends, fatigue is reduced.

It is important that sheaves be aligned. Countless rope dollars have been wasted merely because the sheaves were out of line. Misalignment can be detected by uneven groove wear.

Grooves Should Be Correct—The groove diameter of sheaves or grooved drums should always be larger than the actual calipered diameter of the rope. On the other hand, if the groove is too large the rope will tend to flatten. Too small a groove will cause rope distortion by pinching.

As a rope is bent around a sheave, the strands and wires slide upon each other in an effort to adjust themselves to this curvature. When the rope is pinched in an undersized groove, the strands and wires bind against each other, which increases the abrasion and internal and external frictions, and hinders the readjustment of the rope to its load, forcing some of the wires and strands to carry more than their share of the load.

Groove contours should be inspected for uneven wear. Sheaves that have worn out of round or have developed flat spots will set up vibrations in the rope which will result in an earlier fatiguing of the metal.

The depth and flanges of grooves should be examined to make sure that the rope does not rub against the flange of the sheave when entering and leaving the grove.

The pitch of grooves on a drum should be 1.05 x nominal rope diameter. The depth of grooves should be 25% to 40% of the nominal rope diameter.

Soft Sheaves Cause More Wear—Contradictory as it may seem, a soft iron sheave that wears rapidly will cause more wear on a wire rope than sheaves made of harder materials.

The reason for this is that a sheave of softer material than the wire rope is likely to take an impression of the wire rope and become deeply scored and corrugated, presenting a ragged surface which damages the rope and causes excessive wear.

Deep scoring of soft sheaves pinches the rope and causes it to scrub on sheave flanges. Soft sheaves often become corrugated. A new rope does not "track" in the corrugations. Result: less wire rope service.

A hard sheave does not easily score. It retains its smooth bearing surface that lengthens the life of both wire and sheave.

The Correct Fleet Angle Is Important—The fleet angle is that angle included between lines drawn from the center of the drum and from the flange of the drum to the lead or first sheave. Wire rope is often seriously damaged when this fleet angle is excessive. Side wear and severe scuffing result. Often individual wires become misplaced, bruised, crushed.

Grooved drums are damaged, too, by wide fleet angles. Ropes wear against the groove walls, grinding them down and wearing out the rope prematurely.

Correct Spooling Saves Rope—When a rope is wound onto a drum any tendency of the rope to twist when tension is released will be in a direction which would untwist the rope at its free end.

When a rope is wound on a drum incorrectly, that is, in opposition to the direction of its lay, the coils will spread apart at each removal of load. When winding is resumed the rope may criss-cross and overlap on the drum with a flattening and crushing of the rope as a result.

This can be avoided if right lay rope is used for overwind starting from the left of the drum and for underwind starting from the right of the drum. Similarly on overwind from right to left, a left lay rope should be used and a left lay rope on underwind from left to right.

Proper installation of ropes will do much to avoid costly kinking that prematurely ages rope.

Unreeling and Uncoiling Incorrectly Shortens Rope Life—The reel should be revolved and the rope taken off the reel, the way it was put on. One method is to put a shaft through the center of the reel so that it revolves freely. The rope should be pulled off straight with braking action on the reel to keep it from unwinding too rapidly.

Coils should be rolled along the ground so that the rope will lie straight when it is uncoiled.

Maintenance Includes Regular Inspection—Close examination will not only indicate when it is time to put on a new rope but it will also reveal many things about the way your rope likes its work—whether it is suited to the job.

For instance, wires breaking without showing wear indicate excessive bending; sheave and drums are too small or rope construction is too coarse. Rope crushing or flattening indicates too much pressure, improper winding or a rope that is not constructed to withstand the conditions under which it is being used.

Lubrication Is Essential—Wire rope is a complicated piece of machinery, composed in some instances of over a hundred strands of wire plus a core. As the rope bends over sheaves and drums the wires move and rub against each other. Each wire becomes a bearing surface that grinds and wears against other wires unless all are properly lubricated. Regular lubrication guards wires against corrosion and reduces abrasion.

Ropes in constant daily service are less likely to corrode than inactive ropes. At the first sign of corrosion, however, apply lubricant. Corrosion strikes inactive ropes quickly, unless they are adequately protected by thorough lubrication. Ropes should be lubricated as soon as they are taken out of service.

How To Lubricate Wire Rope—The rope should be clean, dry. It can be cleaned by air, steam or wire brushing followed by a drying out period. A brush, rag or piece of sheepskin can be dipped in the lubricant and used to swab the lubricant onto the rope. A pair of old leather gloves can be used to work the lubricant into the rope.

A wooden or metal trough with three sheaves mounted on shafts does a good job. The trough should be long, though not necessarily deep. The three sheaves should be mounted in line, one near each end of the trough and one in the center, so that the rope being lubricated will ride over an end sheave, under the middle sheave (and into the lubricant) and out of the trough over the other end sheave.

A slush box can be used for vertical rope. A piece of canvas or rubber with a hole approximately the size of the rope forms the bottom of the container assuring an even coating of lubricant.

Shock Loads Sabotage Wire Rope—Any load above a normal working load can develop into a shock load if anything goes wrong to throw unexpected stresses on the wire. Such a shock load may not break the wire at the time, but stresses are set up and the rope may fail later when another operator places full confidence in the strength of the rope. Avoid the possibility of shock loads by faithfully observing the safety factor. It saves lives, machinery and—money!

●

Traffic Engineers at Yale—Eighteen engineers are now enrolled in the graduate course in traffic engineering of the Bureau of Highway Traffic at Yale University. The course requires 8 months in residence at the University.

(*Continued from page* 90)

New Horticultural Methods Needed to Mechanize Landscaping

New York State alone is in the millions. Contracts are being prepared in this state for such work as soil preparation, fertilizing and seeding as separate from the heavy grading and construction contracts. It opens up a new field of contracting on a large scale and the successful bidders will be the ingenious ones who will devise the ways and means of successfully accomplishing the simple agricultural processes with machine tools and minimize on the ever mounting costs of hand labor.

Machine methods suggest the possibility of some deviations in the time honored horticultural practices also. Some recent tests are rather revealing. For example, in some of our tests it has been observed that fertilizer and seed spread on earth surfaces and well covered with a mulch produced as satisfactory a germination and growth as in a costly seed bed preparation. Also a mulch of fine stone, cinders or sand induced the same germination as a hay or manure mulch. Seeds pregerminated before sowing should result in a quick growth before erosion or washing could occur. Loose, moderately rough surfaces are inducive to better growth and less erosion than the slick hand raked surfaces, which fact incidentally obviates the cost of polishing finished grades.

New tools and new methods point to taxpayer economies, more efficient operations and better looking highway roadsides.

488 Get Raises in N. Y.

Promotion of 488 engineers of the New York State Department of Public Works to positions in higher salary brackets is announced by superintendent Charles H. Sells. This is the largest group ever promoted at one time in the Department and includes all engineering employees who passed recent promotion examinations conducted by the State Civil Service Commission. Personnel included will be qualified for further salary increments on April 1, 1948.

As a means of augmenting its staff for the large volume of projects programmed, the department will also call for open competitive examinations in all engineering titles below the grade of Senior Civil Engineer, and request additional promotion examinations, at the same time, for other department personnel not included in the recent promotion list. The examinations will be of major interest to recently graduated engineers.

This marks the first time in fifteen years that any real opportunities for advancement were afforded to large numbers of employees of the State Department of Public Works.

Letters and Comments

Advantage to Contractors of Automatic Batchers

We have no positive figures to show that average production has been increased by the use of automatic batching equipment; but we are told by many contractors that such is the case when the automatic equipment operates continuously. As you can readily appreciate, no common yardstick can be adopted to rate performance on the automatic operated plant as compared to the manually operated plant, because conditions vary so much between individual projects.

The principal objection to automatic batching up to this time has been that the mechanism has been too complicated, and a breakdown would shut down the job. The department has realized that the only way the improved methods were ever to be obtained was to continue to specify them and to work with the manufacturers of this equipment until such time as they could be perfected to the certainty of operation that has been built into the other types of paving equipment. Permission has always been granted the contractor to operate manually while repairs are made to automatic equipment. The necessity for such permission to operate manually is now very infrequent.

The benefits accruing to engineering and inspection are principally uniformity in paving mixtures and relief from constant visual inspection of batching operations. From observation, we are satisfied that the automatic batching results in increased production for the contractor.

In addition to two eastern manufacturers we have on the Pacific Coast four concerns making automatic batchers that comply with our specifications.

R. M. Gillis, construction engineer, California division of highways:

Book Reviews

32-Page Booklet on Cycles Sent on Request

This booklet epitomizes the major results of a research on correlated cycles by Halbert P. Gillette during the last 21 years. It gives dates of the peaks or maxima of cycles and the intervals between maxima, or cycle lengths. Correlated cycles in different kinds of phenomena must have a common cause. A theory of causation is presented that applies to all correlated cycles, such as cycles in weather, in climate, in sunspots, in terrestrial magnetic forces, in terrestrial bombardment by solar electrons, in movements of the earth's crust (both minor and major), in series of geological strata, in intervals between moraines, in varves (annual deposits of sediments in lakes and seas), in tree-rings, in social upheavals recorded historically, etc.

Mr. Gillette holds a mining engineering degree from Columbia University, is a member of the American Society of Civil Engineers, is the author of many papers on Cycles, and formerly was chief editor of Water Works and Sewerage (now Water and Sewage Works), and of Roads and Streets.

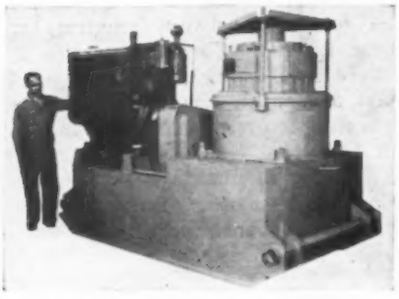
Printing of the booklet will not occur until all requests for it have been received, that is in January. Address requests to Gillette Publishing Co., 22 West Maple St., Chicago, Illinois.

New Construction Equipment and Materials

1

New Portable Crushing Unit

A self-contained portable crushing unit, the 22" packaged series of Symons cone crushers, has been announced by Nordberg Manufacturing Co., Milwaukee, Wis. The unit consists essentially of a 22" Symons Cone Crusher, motor and drive, mounted on a welded steel supporting base and skid. It can be furnished with electric motor or with diesel or gasoline engine drive. The electric driven unit is furnished with 25 h.p. 1200 R.P.M. motor (for 60 cycle service), starter with push button station, V-rope drive and safety guard. On the Diesel and gasoline engine units the steel supporting base is fitted with a built-in 85-gal. fuel oil compartment and



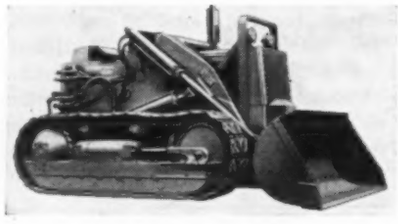
22" Packaged Series of Symons Cone Crushers

a 60-gal. lubricating compartment. The Diesel engine has an oversize rating of 50/55 h.p. at 1500 R.P.M. governed speed. The shipping weight of the electrically driven unit is 10,500 lb. and of the engine driven limit, 12,400 lb. The overall dimensions are 122½ in. long; 71½ in. wide, including V-belt drive and housing, and 86½ in. high.

2

New Bulldozer Shovel

A new 2 yd. bulldozer-shovel has been announced by Frank G. Hough Co., Libertyville, Ill. Designed into the International TD-14 diesel tractor, the Model 14 bulldozer-shovel is stated to incorporate many new exclusive features. A large capacity, front mounted hydraulic pump, directly connected to the engine crankshaft supplies power for all operations. By means of a single lever the operator can raise, lower, hold or "float" the bucket, or apply down pressure when hard digging is encountered. In addition the



Model 14 Bulldozer-Shovel

bucket may be dumped partially or completely at any height and returned by hydraulic power. An automatic bucket tip-back tilts the bucket back 38° in carrying position to prevent spillage. The tracks are not tied down, but oscillate freely, to conform to ground contour, as in normal tractor operation. Front end superstructures are entirely eliminated providing the operator with complete visibility in every direction. The bucket extends the full track width of the tractor, to permit excavation close to walls, embankments and slopes. A full track width bulldozer blade can be attached in a matter of minutes, enabling the bulldozer-shovel to handle a wide variety of bulldozing jobs consistent with the size of the tractor.

Mail Inserted Card

For data on equipment described on these pages. See also inquiry blank on page 131.

3

New "Caterpillar" Products

Three new products have been announced by Caterpillar Tractor Co., Peoria, Ill.—Diesel No. 212 motor grader Diesel D311 engine and Diesel D2 trac-type tractor. The new Diesel No. 212 has a maximum power output of 45 h.p. as compared with the 35 h.p output of its predecessor model. Its operational advantages stem from speed increases in all of its four forward speeds; from its power operated mechanical controls equipped with effective brakes which prevent creeping or coasting under load; from its arched front axles which provides maximum clearance; and from manufacturing improvements resulting from the use of new, harder metals and better heat treatment. The power increase of the new Diesel No. 212 comes from the features of design and manufacturing skill incorporated in the new, more powerful D311 engine which powers it.

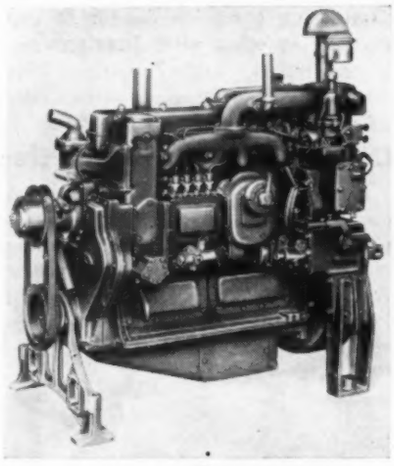
Refinements of this new engine, as outlined by the manufacturer:

Bore increase from 3¾ in. to 4 in., resulting in an increase to 252 cu. in. in piston displacement and the application of stronger connecting rods and

Diesel No. 212 Motor Grader

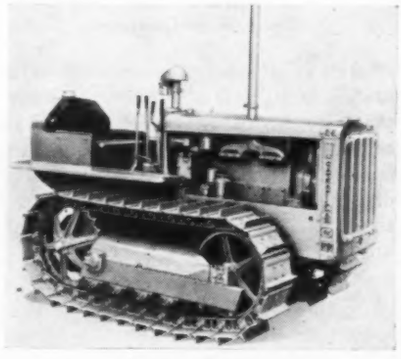
a heavier, stronger crankshaft. Chrome plated top piston rings. Divided manifolding, allowing an independent port for each valve. Larger and more efficient air cleaners. Improved oil pressure control system. New fuel injection valve design with the pressure-operated valve mechanism enclosed in a copper capsule. A new governor, anti-friction bearing

equipped, to provide sensitive, accurate control. Three tube type oil cooler mounted beside and flush with the water radiator core.



Diesel D311 Engine

The new D2 tractor, developing a maximum 32 drawbar horsepower, fits itself into the construction picture with its ability to handle auxiliary tools on many operations. And the D311 engine, available as industrial



Diesel D2 Tractor

power unit and electric set as well as a marine engine, has its place in the power planning of the contractor requiring power and lights for machine shops, motor pools, crushing plants, offices and similar installations.

4

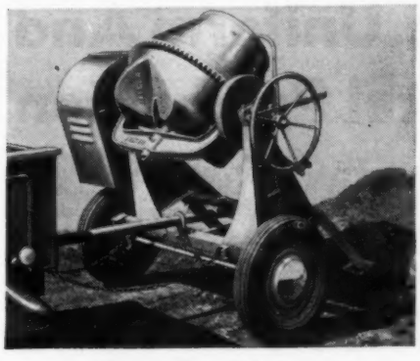
New Blaw-Knox Product

Blaw-Knox Co., Pittsburgh, Pa., has completed a redesign of a major portion of its line of construction and road-building equipment including the development of a number of new items. Highlighted in this development of new and improved items is a revolutionary type of road subgrader for paving construction that utilizes vibration to disintegrate and cut through the material to be excavated. A streamlined "Hi-Boy Truckmixer" is the first Blaw-Knox entry in the high-discharge type of truck mixer and it features a common hopper for charging the materials into the drum and discharging the mixed concrete. Also included are an improved high speed vibratory paving spreader which can handle the output of two dual-drum paving mixers; an improved design finishing machine with greater range of traction and screed speed combinations for more efficient finishing of varying textures of concrete; a newly developed widening finisher for the modernization of narrow, unsafe roads; twin weighing batchers for one-stop batching of aggregates or cement into dual-batch trucks; a new portable bulk cement plant with common structural frame but with combination arrangements of bins, permitting easy expansion by contractors faced with need for larger capacity. The company has also developed a new type of articulated face form for radius construction of concrete curb and gutter, bringing new labor savings to this exacting work.

5

New 3½-S Mixer

An improved 3½-S end-discharge, tilting mixer has been announced by Jaeger Machine Co., Columbus, O. This machine is towed in mixing position with support legs at the rear. Thus, the unit may be backed directly up to material piles and, with the towpole removed, is immediately ready to go to work without turning or spotting and without projecting feet in front to interfere with the wheeling in of barrows or concrete carts



New Jaeger 3½-S Mixer

to receive the discharge. Another exclusive feature is the V-bottom drum design, patented by Jaeger, which combines with two double mixing blades to produce fast, criss-cross movement of the material. The drum turns in two Timken tapered-roller bearings. Drum bowl, yoke and ring-gear are of heavy semi-steel; the drum cone is rolled steel, with solid steel half-round reinforcing the drum opening. The unit is driven by a 2½ h.p. aircooled, Wisconsin engine, with reduction gear and chain drive, all fully enclosed and protected from carelessly-thrown loose material.

6

New Earth Drill

A new hydraulically controlled earth drill that drills 6 in. to 42 in. diameter holes to depths of 10 ft. has been announced by Buda Co., Harvey, Ill. All special features of this Model HBJ earth drill are engineered for convenient transporting and minimum "set-up" time for digging. Steady hydraulic power of the HBJ moves the tower into instant operating position. Other finger tip controls quickly permit adjustment of drill head to a vertical position. All leveling adjustments for either straight holes or anchor holes are completely hydraulic. The drill is powered by a slow speed 4-cylinder Buda gasoline engine. The engine, together with the

Model HBJ Earth Drill

drilling mechanism, is mounted on an "I" beam of structural steel. A flat-bed truck or a heavy 4-wheel trailer is recommended for mounting the HBJ. The unit is quickly removed from vehicle to permit truck or trailer use for other purposes. A pole setter tower extension and power driven winch, furnished as optional construction, is a factory installed part of the unit for power pole work.

7

New Lubricating Oil

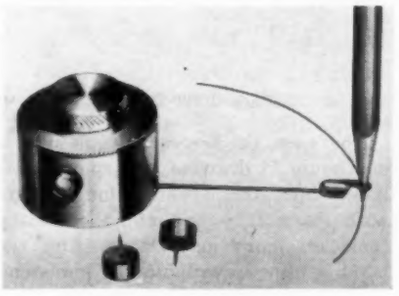
Combining the advantages of full detergency and the tough film qualities of paraffin base, a new oil for automotive Diesel engines and for gasoline engines operating in extra heavy duty service has been developed

by Gulf Oil Corporation, Pittsburgh, Pa. The new product, named Gulflube H. D. Motor Oil, has been designed to incorporate the most important recent advances in lubricant research in a form specifically adapted to its field of service, according to the manufacturer. The paraffin base, which gives a particularly strong oil film, functions to provide superior lubrication under severest operating conditions, both protecting engine parts and improving performance. The full detergent characteristic of the oil, in automotive Diesel use, is stated to assure cleaner engines, avoiding high temperature sludge, piston varnish, lacquer, and stuck rings. Deposits and ring sticking due to oxidation in extra heavy duty gasoline engines also are avoided by full detergency. Harmful deposits from sources other than oxidation, such as heavy ends of unburned fuel which may pass the rings and contaminate crankcase lubricating oil, are minimized. Other advanced characteristics of the new oil result from inclusion of the maker's patented anti-foam agent, which prevents crankcase foaming under severest temperatures and speeds; low pour point, assuring minimum drag and frictional resistance in cold weather starting; and high viscosity index, giving high pressure gauge readings while motor is idling. The oil has also been made entirely non-corrosive, eliminating corrosion danger to copper-lead or other alloy bearings.

8

Device for Drawing Circles

Circles from 2 in. to 12 ft. in diameter can be made with the new vest-pocket size Flex-A-Beam compass, manufactured by Stewart-Jackson Instrument Co., Los Angeles, Calif. It also may be used to draw ellipses, spirals and arches. It consists of a stretch-proof linen line on an aluminum encased reel. Three special push-pins are furnished which serve as center points for the compass. A releasing button permits the line to be drawn out to whatever radius is desired. The linen line will hold true to any desired length, it is claimed.

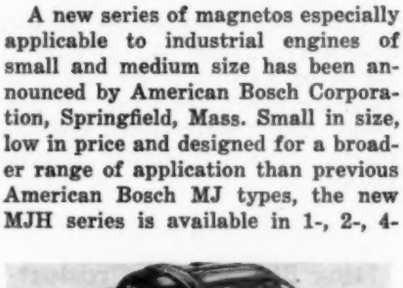


Flex-A-Beam Compass

9

New Magnetos

A new series of magnetos especially applicable to industrial engines of small and medium size has been announced by American Bosch Corporation, Springfield, Mass. Small in size, low in price and designed for a broader range of application than previous American Bosch MJ types, the new MJH series is available in 1-, 2-, 4-

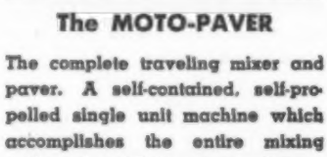


Series MJH Magneto

H&B SECTIONAL TYPE

Portable ASPHALT PLANTS

For Dependable, Uniform And Economical Production



The MOTO-PAVER

The complete traveling mixer and paver. A self-contained, self-propelled single unit machine which accomplishes the entire mixing and paving job in one continuous operation. Write for Bulletin MP-47.

First to build the sectional type asphalt plant, Hetherington & Berner, Inc., has always striven to build machinery which would give uniformly dependable production over a period of years. The record of H & B plants under all kinds of operating conditions is the best answer as to how well he have succeeded.

H & B sectional type plants are built in two general models: Model PE electrically driven plants, recommended primarily for contractors who do not ordinarily move more than once or twice a season. Model PA plants, designed primarily for the contractor who moves frequently and who must be able to get efficient production on small as well as large jobs, and under a wide variety of operating conditions.

Bulletin P-46, describing both PE and PA plants, will be sent on request.

HETHERINGTON & BERNER INC.

721 Kentucky Ave. Indianapolis 7, Ind.

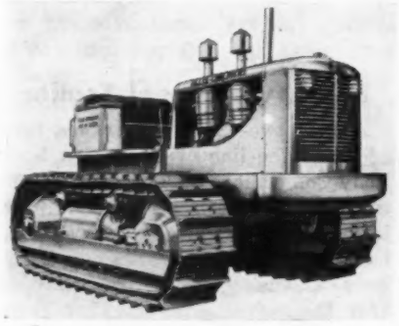
America's First Builder of Asphalt Mixing Equipment

and 6-cylinder executions. It combines rugged mechanical features and fine electrical characteristics, employing an oil-impregnated stationary winding and an Alnico magnet rotor. The 1- and 2-cylinder gearless types are equipped with ball bearings on the drive end of the rotor shaft, while those with gear-driven distributor rotors have ball bearing at both ends of the magnet rotor. The breaker assembly is removable as a unit, and once the contact points are aligned on the assembly, no further alignment is necessary after installation of the unit in the magneto.

10

New 20-Ton Tractor

A 20-ton HD-19 diesel crawler tractor is now in production by Allis-Chalmers Manufacturing Co., Milwaukee, Wis. Engineered completely new throughout, the new tractor is claimed to offer the following advantages: By means of a three stage hydraulic torque converter introduced into the power train of the tractor the capacity



HD-19 Diesel Tractor

for doing more work is greatly increased. Application of the liquid drive principle permits horsepower output of the engine to be held constantly near the maximum. Operating adjustments, maintenance points and major assemblies are so located and designed that the care, maintenance and repair of the tractor can be accomplished with the least possible effort and loss of time. Longer life is assured by the hydraulic torque converter which eliminates shock resulting from master clutch engagements. Special care was taken in designing the HD-19's operating facilities so that top operator efficiency would be maintained through the entire working shift.

The HD-19 transmission has only two forward speeds (0 to 3.0 low gear, 0 to 7.0 high), and one reverse (0 to 5.5). Other important features include: An A-frame track stabilizer design; a tracktread of 84 in. plus 8 ft. 10⅝ in. of track on ground; a 16

JACKSON

MUNICIPAL PAVING UNIT

Knocks the Socks off **PAVING COSTS!**

This revolutionary new development in Municipal Paving Units has definitely proved that it can place perfectly upwards of 65 cubic yards of concrete in a single hour!

FURTHERMORE, IT EMPLOYS THE ONLY SCREED THAT WILL:

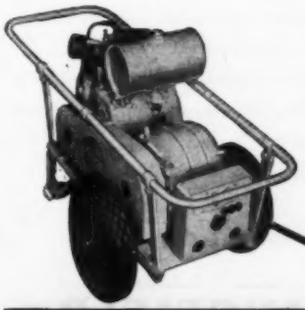
1. Undercut at side forms,
2. Roll back for second pass.
3. Strike-off crowns, both regular and inverted.
4. Permit operators to work from front, rear or sides.

In addition, the screed has such a strong tendency to propel itself in the forward direction that only small effort is necessary to strike-off stiff mixes of concrete. Manholes and storm sewers are no handicap due to the fact the screed does not reciprocate. Does an excellent job of vibrating concrete in slab depths up to 10 inches. Can be used to great advantage on any slab width from 6' on up to any practicable width. For radically reduced costs and far greater production, by all means write for complete details of this remarkable paving unit RIGHT NOW!

The COMPLETE UNIT CONSISTS OF:

1 The Model SC200 Screed (for slabs up to 16' wide) or Model SC202 (for slab widths from 16' and up) — activated by the famous JACKSON Vibratory motor. Light weight, easily transported — quickly converted from one slab width to another.

2 One of our famous Portable Power Plants which provide a wide range of vibratory frequencies thus assuring perfect placement of any concrete mix usually specified. These husky plants are Wisconsin engine powered and have permanent magnet generators which require no adjustment or maintenance.



MODEL M-1 POWER PLANT

furnished with Model SC200 Screed. Capacity: 1.25 K.V.A. Generates both single phase and 3-phase 110 Volt 60 Cycle AC. Also ideal for operating lights, vibrators and powers tools.

ELECTRIC TAMPER & EQUIPMENT CO.
LUDINGTON MICHIGAN

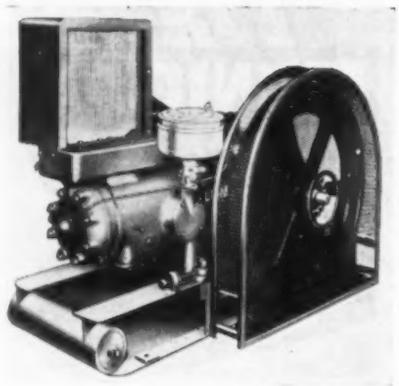
in. ground clearance.

The new HD-19 is powered by a 6-cylinder, 2-cycle Diesel engine.

11

New Multi-Fuel Engine

A new heavy-duty line of single cylinder horizontal 2-cycle, multi-fuel engines has been announced by White-Roth Machine Corporation, Lorain, O. The first model, known as Lorain Type L, is now in quantity production and available for short-time deliveries. It will operate on diesel fuel, natural gas or butane. This engine has a rating of 10.7 h.p. at 300 R.P.M. and 21.4 h.p. at 600 R.P.M. It has a 7½ in. bore and 8 in. stroke with Timken bearings on crankshaft and crosshaft. "Wet" cylinder liners can be replaced in the field. Condenser type cooling system eliminates need for water pump and



Lorain Type L Engine

makeup water is negligible. Standard equipment includes Twin Disc clutch, Pierce governor, Air Maze oil bath type cleaner, McCord lubricator. Radiator, fan, V-belts, sparkplug and magneto are enclosed in metal guards. Over-all dimensions are: height, 52½ in.; length, 70 in.; width, 47¼ in. Shipping weight is 2500 lb.

12

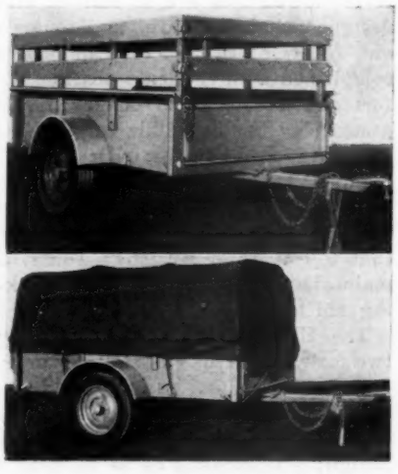
Concrete Improver

Portite, an additive for concrete, which has been under test and in successful use for over 5 years on various types of construction in a restricted eastern territory, is now being offered to the construction industry at large by Hopper Products, Inc., New York, N. Y. Portite is a stable, neutral, long chain organic compound in concentrated liquid form ready to add to the mix. It is stated that as little as ¼ pint per bag of cement provides more easily workable concrete with less water. Other advantages claimed to be provided by Portite include reduced shrinkage, with less need for expansion joints, elimination of segregation and dusting. Less time is stated to be needed for placing and finishing Portite-improved concrete, and it provides unusually high strength and adhesive qualities.

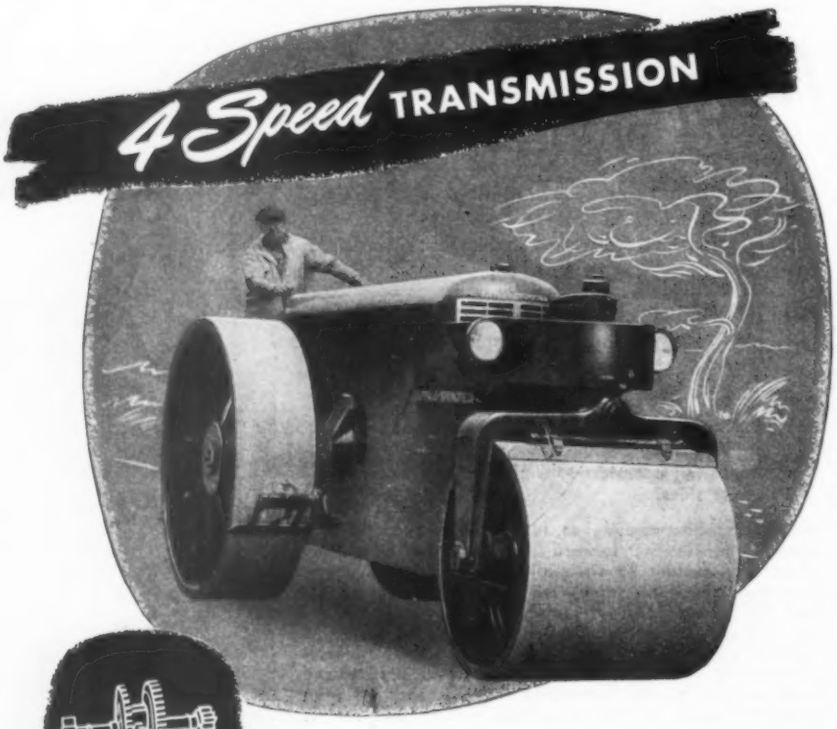
13

New Two-Wheel Trailer

A new two-wheel trailer has been added to the line of Perfection Steel Body Co., Galion, O. This Corbey unit is made in two sizes, 6 ft. and 8 ft. long. Both sizes are 4 ft. wide and have 17½ in. flared steel sides. Three body extension units are available (for the 8-foot size only) at extra cost. These include a 22 in. low stake rack, a 46 in. high stock rack, and a bow top with tarpaulin cover. Illustration shows the unit equipped with low stake racks and bow top. End gates are provided on both front and rear of the trailer. Because these end gates swing from the top (as well as the



Cobey Two-Wheel Trailer



Means full engine horsepower is available at all speeds through a compact and simplified 4-speed forward and reverse transmission. With 4 gear speeds available, no engine throttling with its accompanying loss of power is necessary. Learn more about this "unsurpassed" performance feature today from your Buffalo-Springfield distributor.

THE STANDARD OF COMPARISON

BUFFALO SPRINGFIELD

SPRINGFIELD, OHIO

DESIGNED TO DO THE JOB!
The La Crosse heavy duty trailer's exclusively designed goose-neck construction provides a trailer with strength and performance second to none . . one piece main beams from end to end . Check this and the many other outstanding features and you'll "Look to La Crosse for transportation."
Dealers In 48 States
HEAVY DUTY
LA CROSSE
TRAILER CORPORATION
LA CROSSE, WISCONSIN

bottom) it is easy to dump bulk material. When both gates are dropped, they line up flush with the floor giving almost 11 ft. of floor space on the 8-ft. size. Floor is made of 14 gauge ribbed steel, reinforced underneath with heavy cross bolsters. Wheels have tapered roller bearings, sealed against dust and water. Heavy pressed steel tongue is provided with ball-and-socket trailer hitch. Listed as standard equipment are regular 6:00 x 16 passenger car tires, steel fenders, tail light, license plate bracket, tail gate chains, and fold-up tongue stand.

14

New Deci. Log Log Slide Rule

A new deci. log log slide rule has been announced by Pickett & Eckel, Inc., Chicago, Ill. The scales on the front of the rule are so arranged that only one setting of the hairline gives with each result its square root, cube root and logarithm. The log log scale on the back is expanded for greater accuracy, and arranged to give these five readings with each setting of the hairline: (1) Decimal fraction to 4 and 5 figures, (2) its reciprocal to 4 and 5 figures, (3) logarithm, (4) cologarithm, (5) natural logarithm to base. The scales read from one ten billionth to ten billion, and give decimal point location. A simple legend tells which scale to read when raising to powers. The slide rule is made of magnesium alloy with plastic surface bearing permanent, expanded, easy-to-read washable scales. Size is 12⅛x2⅛x 3/16 in. It comes complete with carrying case, illustrated instruction manual by Prof. M. L. Hartung, University of Chicago, set of typical problems.

BIGGER PAYLOADS
with WELLMAN
Williams Type BUCKETS
• Exclusive features in design and construction make payloads bigger...at lower cost! Weight is balanced, not cumbersome. Extra strength is built into every part with the sturdy welded rolled steel construction pioneered by Wellman, the leader for over fifty years. A type for every service!
THE WELLMAN ENGINEERING COMPANY
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SEND FOR BULLETIN

15

New Rod for Hard-Facing

The availability of new Colmonoy plastic bonded rod in 5 lb. coils has been announced by Wall Colmonoy Corporation, Detroit, Mich. This rod which is supplied in ⅛ in. and 3/16 in. diameters—makes it possible to execute the Colmonoy sprayweld process using wire metallizing equipment which will handle wires of these diameters. Colmonoy plastic bonded rod is composed of powdered Colmonoy No. 6, combined with a plastic binder —and extruded to the above sizes. As this rod passes through the flame of the metallizing gun, the plastic burns out—leaving the Colmonoy particles to deposit on the surface being sprayed. After the desired amount of overlay has been applied (a minimum of .010 in. to maximum of .125 in.) it is bonded to the base metal by means of a large Oxygen acetylene torch, induction equipment or a controlled atmosphere furnace. With any of these methods the final result is a molecular bond between the Colmonoy and the base metal identical to that obtained when the same alloy is applied in rod form.

It Takes

"TOUGH HARDNESS"

TO WIN PRODUCTION BATTLES

HARD-FACING is the best weapon to combat abrasion, shock, high frictional heat, and impact. These are the day-by-day enemies of equipment parts subject to excessive wear.

TO RESIST the constant banging, grinding, scraping and pounding encountered in today's industrial battle of production, the hard-facing "weapon" must be tough and hard.

THE LIFE OF WEARING PARTS can be extended many times when protected with Mir-O-Col hard facing metals. They possess the required "tough hardness" to withstand maximum abrasion at high heat, plus great resistance to shock and impact.

WELDORS CAN APPLY smooth flowing Mir-O-Col rods easily, with minimum splatter loss. They cost considerably less per pound than any other rod of comparable quality

WIN THE BATTLE AGAINST WEAR

with

MIR-(HARD RODS FACING)-COL

Manufactured by

MIR-O-COL ALLOY CO.

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LOS ANGELES 11, CALIFORNIA

MIR-O-COL HARD FACING *HAS* "TOUGH HARDNESS"

WRITE for your FREE COPY of

"The Welder's Guide to Successful Hard Facing"

ATTRACTIVE AREAS OPEN FOR DISTRIBUTORS

Write For Information

16

New Portable Water Carrier

A new portable water carrier designed for use on construction jobs, recently placed on the market by Dixie Cup Co., Easton, Pa., is made of stainless steel and is well-insulated to keep water cool for many hours in the field. It has a recessed faucet which turns off automatically when released. A lug is provided for a single or double unit Vortex paper cup dispenser. The double unit dispenser has a receptacle for used cups.

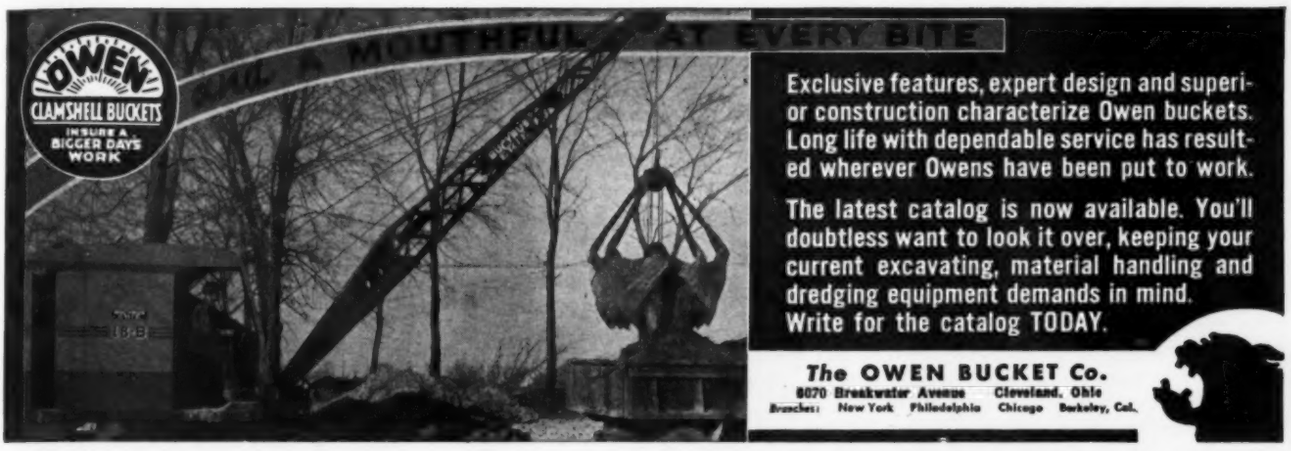
Dixie Portable Water Carrier

The carrier is finished in olive green with chrome trim. The capacity is approximately 4 gals.; size 18 in. high, 15 in. long, 8 in wide. Two adjustable carrying straps are provided. Each drink is served in an individual Vortex paper cup, eliminating the chance for mouth-borne contagions.

17

New Bulldozer

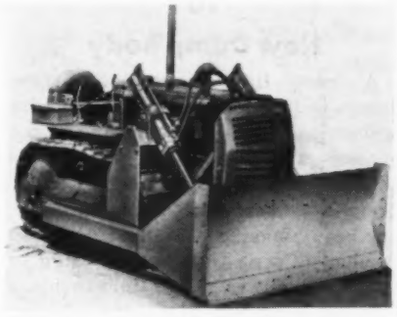
A newly designed bulldozer combining proved methods by hydraulic operation with improved construction features recently tested with pilot models is being introduced by Wm. Bros Boiler & &Mfg. Co., Minneapolis, Minn. The Bros Power-Plus line of dozers, both straight and angle, available now for D4 and D6 Caterpillar tractors, incorporates the "fluid power control" provided by the LaPlant-Choate hydraulic pump. The D4 models have full-floating trunnion rams. The D6 dozer is frame mounted and incorporates the new compact pump with a minimum of hydraulic piping. A rigid frame with floating moldboard is claimed to incorporate these advantages in the Power-Plus: Great strength, offset pivot pin for



Exclusive features, expert design and superior construction characterize Owen buckets. Long life with dependable service has resulted wherever Owens have been put to work.

The latest catalog is now available. You'll doubtless want to look it over, keeping your current excavating, material handling and dredging equipment demands in mind. Write for the catalog TODAY.

The OWEN BUCKET Co.
8070 Breakwater Avenue Cleveland, Ohio
Branches: New York Philadelphia Chicago Berkeley, Cal.



New Straight Dozer for 4D Caterpillar Tractor

clearance, easy removal of main frame and blade, reversible cutting edge, correct and proved blade curvature. On the straight models a new reinforced fan tail box construction eliminates multiple welded pieces. This new design is stated to permit equally distributed push beam stresses. The moldboard fan tail design is offset from the push frame and made wider for easier maneuvering and less wear. The new straddle mounted cylinder bracket assembly centers lifting power and equally distributes all working forces. The full floating hydraulic cylinder assembly permits free movement in all directions. The new special ram is fabricated from select steel tubing, bored, and honed to mirror finish. Fabric piston rings, impregnated with neoprene, take all the wear and provide a super-sealing action. The hydraulic pump is compact and simply engineered, eliminating cumbersome piping. On front mounted units a new style drop-hinged guard is used, permitting easy access for maintenance. D4 units can be front or rear mounted. D6 units are front mounted only.

MORE MATERIAL MOVED... *at Lower Cost!*

SCOOPMOBILE

Scoopmobile is designed and engineered to *efficiently* handle and move many types of material... at lowest possible cost! Loads . . Lifts . . Hauls . . Scoops . . Pours . . Stacks . . Spreads . . Moves—most any type of bulk material. Scoopmobile tows from job to job behind any pick-up or truck. Lifting capacity is 4000 lbs.

Write Dep't RS for complete information and name of your nearest dealer.

Quick change attachments include bucket, concrete hopper, lumber forks, crane boom, etc. Discharge height with standard track is 7¾ ft. Available with enclosed cab, power steering.

MIXERMOBILE MANUFACTURERS
6855 N. E. HALSEY STREET, PORTLAND 16, OREGON

18

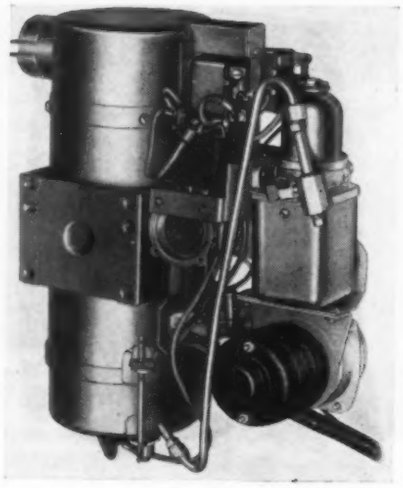
New Parking Meter

A new meter that meters the same number of parking spaces with half the number of meters, yet provides more operating space for parking and leaving, has been announced by American-LaFrance-Foamite Corporation, Elmira, N. Y. The new product, the Alfco Twin Meter, permits parking two cars independently of each other with but one meter, one clock, one housing, one pedestal and one coin box. The two cars are parked bumper to bumper at the twin meter, leaving all the parking space thus saved for easy entry or exit to and from the parking space. The number of parking stations is not reduced.

19

New Engine Heater

An engine heater for heavy-duty power equipment that works from the inside out by heating the engine coolant, is a new development of Perfection Stove Co., Cleveland, O. It is an auxiliary heater operating independently of the engine. The heater was designed primarily for use with equipment which is exposed to the elements for long periods during the cold months, and thus suffers from damage to innermost parts and interruption and delays in operation due to exposure to intense cold. It can be installed on practically all types of motor power—trucks, tractors, locomotives, power plants, gasoline and diesel engines, farm equipment, road building machinery, contractors machinery and automobiles. The new engine heaters are furnished for either completely automatic, thermostatically-controlled operation, or for varying degrees of operator control. They come equipped with a steel heat exchanger for coolant circulation, operating with a thermosyphon head. Exhaust gases can be carried beneath the heater and further utilized for oil pan heating and similar application. Dimensions of the engine heater are sufficiently small to permit mounting on automotive equipment, usually under the hood in the engine compartment. Or, it can be mounted on the frame in the wheel housing or between the radiator and grill. There are five models of the heater from which to choose. Basically, their principle of operation is the same, but each is designed to meet various requirements.



Exterior View, Model 480-PA Engine Heater

20

New Dump Body

A new lightweight, all-purpose dump body, designed primarily for economical hauling and placing of top quality air-entrained concrete, and adaptable to the transportation of aggregate and similar bulk materials, has been announced by Hercules Steel Products Corp., Galion, O. Design of the new unit is stated to provide a smooth, complete discharge of concrete from the bottom of the body first, preventing premature decanta-

MINIMUM UPKEEP—MAXIMUM PERFORMANCE

GRACE PRODUCTS ARE BUILT TO DO THE JOB RIGHT!

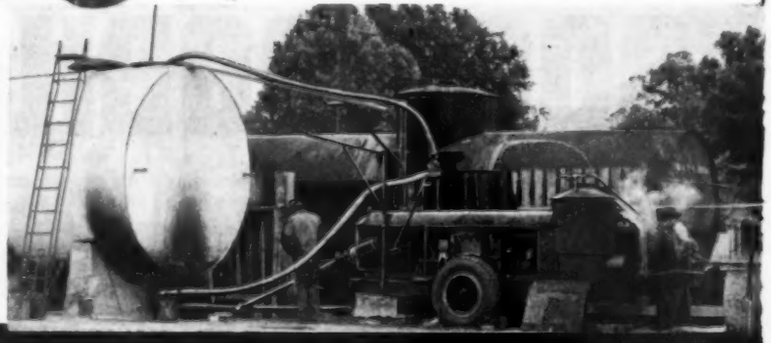
GRACE 2-WAY AXLE DRIVEN SWEEPER

A multi-service sweeper which meets the most rigid requirements. Simple transmission and pivoting mechanism assures simple operation. Completely adjustable, the brush lift and brush pressure are independently operated . . . May be changed in a few seconds to sweep either right or left at angles up to 30°.. Anti-friction throughout. Brush features long life bristles and steel center shaft which eliminates warping!

GRACE RAPID FIRE

Combination Circulating and Steam Heater

Two units mounted on one chassis for maximum performance. Steamer can thaw one car while the circulator is heating and loading out another car by circulation. Asphalt flow over flues is 160 feet per minute at 200 GPM. Flue-expansion stress is eliminated. Powerful LeRoi D140 motor and pumps mounted on sturdy sub-frame which is bolted to main frame of heater. Chassis suitable for truck mounting.



W. E. GRACE MANUFACTURING COMPANY

6000 SOUTH LAMAR STREET DALLAS, TEXAS

New Hercules Concrete Body

tion of lighter materials from the top of the load and eliminating segregation and bleeding. Four point suspension and low hinging provide maximum safety in high discharge operation, even under difficult operating conditions frequently found in construction work. Elimination of all excess weight and unnecessary mechanisms permits the Hercules concrete body to be used in direct pours without any wheeling or buggying as the unit is easily maneuvered even on subgrades. Preliminary models of the concrete body have been thoroughly tested and proved in on-the-job service and full-scale production of the 3 cu. yd. capacity model is already under way.

21

Decorative Treatment of Concrete

A new method of forming bevels and decorative grooves on concrete surfaces by means of rubber strips attached to the forms instead of conventional wood strips has been developed by United States Rubber Co., New York, N. Y. The rubber is said to produce a smooth finish free of blemishes and it can be re-used many times. The new strips will be produced in various shapes and sizes for bevels and also decorative treatment. They are attached to the form with a waterproof adhesive. They can be removed easily without chipping the mortar. The new method is being used for the first time on piers for a bridge spanning the Chesapeake & Delaware Ship Canal at Chesapeake City, Md.

22

Filter - Meter

The filter-meter, an attachment for oil clarifiers that shows the condition of the oil when the motor is running is a recent development of W. G. B. Oil Clarifier Inc., Kingston, N. Y. The filter-meter shows the color of the oil and also the flow. When the oil is of a good color and the ring in the meter

W. G. B. Oil Clarifier with Filter Meter Attached

rises above half-way to the top while the motor is running, the cartridge is still good; but when the oil becomes dark and the ring in the meter stays close to the bottom while the motor is

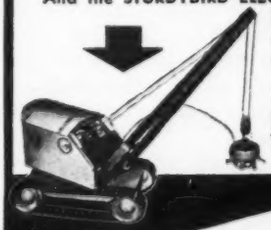
"I'M JACK DOUGLAS . . . the fellow you didn't expect to see here . . . and I make these Sturdybird construction toys. They're the real thing in miniature and good . . . like the big equipment they're patterned after.

I've been thinking what I'd do if I was in the construction business in a big way and I wanted to remember my customers' kids at Christmas. I'd give 'em these Sturdybirds! Boy, wouldn't a real construction-minded youngster go for that!

And it wouldn't take his dad's mind off the fact that I've got some real equipment myself that should be working for him. How's that for a hint? I'll take your check and send your customer the best boy's Christmas present of all time."

And the STURDYBIRD ELECTRO-MAGNETIC HOIST. Built big and strong like the Sturdybird Crane. Battery powered steel-cased magnet lifts 10 lbs. Drops the load at a flick of the switch! $10.00 express prepaid.

MATCHED SET of both Sturdybirds . . . $18.50 express prepaid. They'll both keep Christmas alive all year!



STURDYBIRD CRANE

Powerful clamshell bucket, boom hoists and lowers, cab swivels to any position, wide moulded rubber treads, honest - to - goodness welded steel construction . . . a big heavy job 31 inches long, in bright play colors.

$8.50 Express Prepaid

"NOW, HERE'S SOMETHING SPECIAL! On all orders for one dozen Sturdybirds, or more, I'll stencil your Company's name right on the toys where it won't be overlooked! That's what I call an on-the-job 'silent salesman'! I'll take the whole problem off your hands, ship right to your customers' homes, and you'll be known as the 'stand-out' Santa Claus of the year"!

Jack Douglas,
TECH-ART, INC., MILFORD 7, OHIO:
Here's our order for Christmas Sturdybirds . . .

☐ (Quantity) Sturdybird Cranes at $8.50 each, express prepaid;
☐ (Quantity) Sturdybird Electro-Magnetic Hoists at $10.00 each, express prepaid;
☐ (Quantity) Matched Sets of Both Sturdybirds at $18.50, express prepaid.
(Ohio residents only add 3% Ohio Sales Tax)
☐ Ship to us. ☐ Ship to attached customer address list.

NAME.....
COMPANY.....
ADDRESS.....
CITY.....STATE.....
COMPANY NAME TO BE STENCILED ON TOYS (Print)
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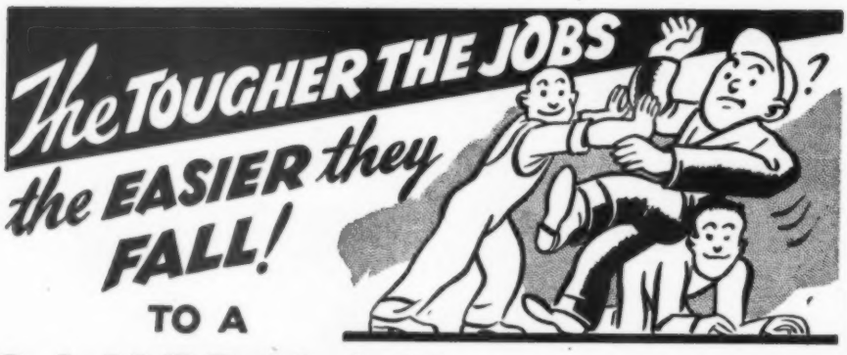


TO A

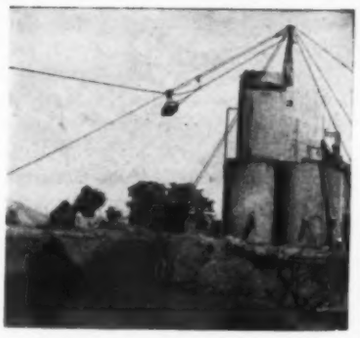
SAUERMAN

LONG RANGE MACHINE

Sauerman equipment digs, hauls, lifts and dumps material in one operation for long range excavating, stockpiling, or filling. Adaptable to the most difficult conditions. Wide choice of sizes for low cost handling of large or small tonnage. Flexible operating span, extendable up to 1000 ft. or more. Requires only one man to operate.

Low initial cost—Low upkeep

Thousands of users are making extra profits with Sauerman equipment. Let us help on your special problems. Or, if you only need general data on Sauerman machines, simply ask us to send catalog.



The Sauerman Slackline Cableway pictured above spans a wide pit, digs 60 ft. under water and hauls 110 cu. yd. of gravel an hour to hopper on top of screening plant. No other type of machine can do this.

SAUERMAN BROS., Inc.

588 So. Clinton St. Chicago 7, Ill.

EAGLE MODEL 400 LOADER

LOWER YOUR LOADING COSTS

A truly modern loader that incorporates the latest and best ideas in design, function and control. Conveyorized discharge chute permits lower overhead clearance, (11'9") and speedier handling of material.

IT DOES THIS: Gets from job to job at truck speed. Handles any loose material quickly and economically.

WITH THESE: One man operation—Hydraulic control—Capacity—3 to 5 cu. yds. per minute—Positive chain crowd—Mounts on any standard 1½ or 2 ton chasis—Self feeding augers feed material constantly, efficiently, into 20" buckets.

Write for further information and name of your distributor

EAGLE CRUSHER CO., Inc. GALION OHIO·U·S·A

JAW CRUSHERS · IMPACT BREAKERS
PULVERIZERS · CONVEYORS · LOADERS

running—and has a good oil pressure—the cartridge should be changed and a quart of oil added. The filter-meter is simple and well constructed. It is designed to give years of service without parts wear or loss of efficiency. Its glass tube is thermal shock-proof and the aluminum indicator is the only moving part.

MANUFACTURERS' LITERATURE

23

Welder's Guide

"The Welder's Guide To Successful Hard Facing" is the title of a revised informative and helpful booklet now ready for release by Mir-O-Col Alloy Co., Los Angeles, Calif., manufacturers of oxy-acetylene and electric arc hard surfacing overlay rods. The booklet contains many practical suggestions for road contractors and maintenance shops and is accompanied by self explanatory diagrams.

24

Electric Plants

A new 16-page catalog covering the complete line of electric plants of D. W. Onan & Sons Inc., Minneapolis, Minn., gives helpful information and assistance in plant selection to potential users of electric generating plants. The catalog describes electric plant sizes ranging from 350 to 35,000 watts A.C. in all standard voltages, frequencies and phases. If direct current of the "direct service" type is required, selection ranges in 115-volt models run from 600 to 10,000 watts and in 230-volt models from 3,500 to 10,000 watts. Battery charging plants are also described: 6, 12, 24, 32, and 115 volts in sizes from 500 to 6,000 watts. Accessories for easier handling and better installation are described.

25

Heaters and Thawers

A new catalog on its heaters and thawers has been issued by Hauck Manufacturing Co., Brooklyn, N. Y. Several new outfits added to the Hauck line are illustrated and described. These include single and a double burner thawers on wheels and equipment for thawing ground for excavation.

26

Hose Couplings

A hose coupling handbook and service manual, issued by Hose Accessories Co., Philadelphia, Pa., contains useful short cuts for measuring the efficiency and lowering the operating cost of equipment using hose couplings and accessories. Some of the sections in the handbook are: Common Hose Coupling Terminology; Hose Coupling Selection; Correct Procedure for Attaching Hose Couplings; and How to Avoid Hose Abuse.

27

Tournadozer

The new rubber-tired Model C. Tournadozer is illustrated and described in a broadside issued by R. G. LeTourneau, Inc., Peoria, Ill. The folder illustrates by photographs how the speed and mobility of the C Tournadozer can be used to advantage on stockpiling, backfilling, pusher loading and stripping. All of the new design features in this highspeed 'dozer are explained by large-size job action photos, which also reveal how the C Tournadozer can be used.

28

Portable Batching Plants

Blaw-Knox line of portable batching plants and equipment for aggregates and cement are described in a catalog issued by Blaw-Knox Co., Pittsburgh, Pa. Also explained and illustrated are the new twin weighing batchers for one-stop batching of aggregates and cement into two-batch trucks and a new portable bulk cement plant with combination arrangements of bins, permitting easy expansion of capacity where needed. The bulletin has useful references to storage, handling and weighing of the materials and a listing of available sizes and models.

29

Power Units

A new power unit catalog, published by Hercules Motors Corporation, Canton, O., contains information on the complete line of Hercules gasoline and diesel engines and power units now available in a wide range of from 3 to 400 HP. Pertinent information is given throughout the book to assist the power user in choosing the most suitable power for his particular application. A section is devoted to accessories, power take-offs and reduction gears.

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Controlled Application Eliminates Waste

The large pump capacity and efficient control of Kinney Distributors insure fast application: compressed air, automatically admitted as spray bar is closed, cleans bar thoroughly. One simple, three-way valve controls the entire operation of the Kinney Distributor, from circulating or loading, to spraying. Exact register of application strips, without wasteful overlap, is easy with large handwheel control. The Kinney jacketed Rotating Plunger Pump is famous for speed and accuracy . . . it permits high road speeds and applies bitumen in exact quantity specified. Whatever grade of bitumen you use on road work — tar, asphalt, road oil, cutback or emulsions — Kinney Distributors will handle it accurately, fast, and economically.

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A complete range of service-proved types and capacities, available to meet your every general or unusual hauling requirement.

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DESIGNERS and BUILDERS of HEAVY DUTY TRAILERS SINCE 1915

Shunk Snow Plow and Ice Removal BLADES
Proved record of superior performance. Made of specially developed steel to withstand severe service conditions.
FOR ALL TYPES AND MODELS OF SNOW PLOWS
Various widths, lengths, thicknesses--flat or curved--standard or special--punched ready to fit your machine.
SHUNK SAW-TOOTH ICE BLADE
Amazingly effective. Thoroughly breaks up and removes heavy, slippery ice and snow formations. Replaces all types of snow plow blades or maintenance units. Write for Bulletin and name of nearest Distributor.
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SPECIFICATIONS FOR
CONSTRUCTION
BITUMINOUS SURFACING

If You Are a—
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and
Bituminous Surfacing is
One of Your Responsibilities
YOU
Should Have These New,
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1000 ROOMS WITH BATH
RADIO IN EVERY ROOM
SIX FINE RESTAURANTS
CENTRAL DOWNTOWN LOCATION
GARAGE ATTACHED

JAMES J. FITZPATRICK
GENERAL MANAGER

30
Dewatering Rotoscoop

The dewatering rotoscoop of Link Belt Co., Chicago, Ill., first announced to the trade in 1935, is described in a new illustrated 4-page folder No. 2263 as being a sand dewatering device capable of recovering the available sand grains, of sufficient fineness to meet specifications, and discharging the product dry enough to permit truck transportation, or mechanical conveying to and from storage. The folder gives dimensions, capacities, horsepower required and weight.

31
Engine

A new 10 H.P. engine developed and manufactured by D. W. Onan & Sons, Inc., Minneapolis, Minn., is illustrated and described in booklet "Power Points" issued by the company. One section of the publication describes the "CK" engine in action and includes many photographs and illustrations of the engine in use. Small tractors, pumping units, plows, conveyors, pick-up vehicles, floodlights, welders and inboard marine engines are some of the applications illustrated. Mass production of the "CK" Engine, from foundry to machine shop and assembly to shipping room is also described.

32
Slurry Pump

A new slurry pump having wear parts centrifugally cast of abrasion resistant Diamond alloy is illustrated and described in a 16-page bulletin of Pettibone Mulliken Corporation, Chicago, Ill. Complete, detailed description, engineering and pumping data, selection chart, dimensions, assembly drawings and parts list are included. The bulletin demonstrates in general the outstanding mechanical features of the pump, including the characteristics of Diamond alloy.

33
Wire Rope Fittings

A newly revised catalog data book containing much engineering information has been released by The Thomas Laughlin Co., Portland, Me. In addition to presenting detailed working characteristics of each product, Laughlin has included tables and charts which make the catalog a valuable reference book for engineers, architects, riggers and safety directors. The catalog lists many new Laughlin products.

34

Amsco Manganese Steel

Compiled to help both the manufacurer and user of construction equipment, a new 48-page Construction Industry Bulletin, 1143-CI, has been released by the American Manganese Steel Division of American Brake Shoe Co., Chicago Heights, Ill. The bulletin through substantiated facts and on-the-job photographs, covers a broad and representative list of applications for the toughness and durability of Amsco manganese steel in the construction industry. Dippers; crusher parts, chain; ditcher, tractor, loader, bulldozer and scarifier parts; asphalt and concrete mixer parts; wire rope sheaves; welding products; Amsco-Nagle material handling pumps; dredge pumps; and other miscellaneous parts subjected to punishment and wear are fully described and illustrated.

35

Wrought Iron

A 20-page illustrated booklet that describes wrought iron, has been made available by A. M. Byers Co., Pittsburgh. The title is "The ABC's of Wrought Iron." The booklet tells in non-technical terms what wrought iron is, why it resists corrosion and withstands shock and vibration, how it is made, and how it is bent, welded and threaded. The various services for which wrought iron pipe and plates are used in the construction of industrial, railroad, sewage and waterworks, refrigeration, marine and plumbing and heating fields also are depicted.

36

Prefabricated Trestle Bridges

"Made-to measure" highway trestle bridges than can be ordered almost as simply as ordering a suit of clothes are described in a new booklet published by the Wood Preserving Division of Koppers Co., Inc., Pittsburgh, Pa. The booklet gives results of studies made by Koppers' engineers of a large number of bridge designs. Their studies showed that the variables could be taken care of with four types of abutments, four types of bents, two types of decks, and six types of railings. These elements can be combined and adapted in a large number of ways to solve practically all trestle bridge problems ordinarily encountered. The publication gives complete instructions for ordering a "made-to-measure" bridge and contains eight pages of blueprints showing combinations that will take care of normal bridge needs. An accompanying data sheet for quotation can be filled out by answering only 11 questions.

37

Concrete Handling Equipment

Williard concrete handling equipment is pictured and described in a brochure issued by the Steele-Wicker Co., Beverly Hills, Calif. Equipment includes a 2½ cu. yd. transit mixer, a 2½ cu. yd. weigh batch loader and a mixer loader mobile conveyor. Specifications are given.

38

Heavy Duty Truck

The Model TD rear-dump Euclid is illustrated and described in a folder issued by The Euclid Road Machinery Co., Cleveland, O. The Model TD has a payload capacity of 22 tons and is powered by a 275 h.p. diesel engine. Specifications are included.

IT'S POWERFUL
IT'S SELF-CONTAINED
SYNTRON
Gasoline Hammer
PAVING BREAKER
BUSTING Concrete
CUTTING Asphalt
DIGGING Shale
TAMPING Backfill

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New ARNOLD LUBRICATOR

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Easily Portable
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Arnold gives you all of these features:
VISIBLE OIL SUPPLY—The pressure-proof window eliminates guess work. If oil is there, you see it.
POSITIVE LUBRICATION — good to the last drop. Patented feeder insures automatic lubrication.
LIGHT WEIGHT — made from new aluminum alloy, most popular size weighs only 14 ounces.
STRONG—this rugged lubricator can take it, actually stronger than cast iron.
FOUR MODELS—Sizes from 1/6 pt. to 1 pt. capacity. Pipe size to one inch.
FREE—CATALOGUE SHEET
Order from your dealer
If he cannot supply you, write direct, sending us your dealer's name.
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WITH THE MANUFACTURERS & DISTRIBUTORS

Timken Personnel Changes

H. M. Shank, Boston branch manager since 1938 of the Service-Sales Division of The Timken Roller Bearing Co., Canton, O., has been appointed Detroit branch manager to succeed J. D. Jesseph, who resigned to enter the automotive parts agency business. Frank M. Barry, formerly a field representative in the New York office, has been made manager of the Boston branch.

New Euclid Distributor

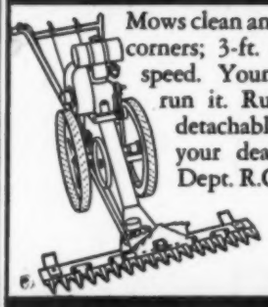
The State Tractor & Equipment Co., Phoenix, Ariz., has been appointed distributor for The Euclid Road Machinery Co., Cleveland, O., covering the entire state of Arizona with the exception of Navajo, Apache and Mohave countries.

New Schramm Distributor

Shaw Sales & Service Co., 5100 Anaheim-Telegraph Road, Los Angeles, Calif., has been appointed distributor for Schramm Inc., West Chester, Pa., for the contractors and construction field in Southern California area.

Appointed District Sales Manager

L. J. Renner has been appointed district sales manager, Chicago, Ill., for the Wickwire Spencer Steel Division of The Colorado Fuel and Iron Corporation. He succeeds T. H. McSheehy who has retired from active service with the corporation.

CUNNINGHAM MOWER

Mows clean and fast in tight corners; 3-ft. cut; variable speed. Young folks can run it. Rugged design, detachable engine. See your dealer or write Dept. R.O.
Fence Rows
Roadsides
Railroads
Farm Lawns
JAMES CUNNINGHAM, SON & CO.
13 Canal Street, Rochester 8, N. Y. Est. 1838

VULCAN PAVEMENT AND CLAY DIGGING TOOLS
ARE MADE in a complete line of sizes to fit all standard compressed air hammers.
Send for NEW Vulcan Illustrated CATALOG today.
VULCAN TOOLS — THE WORLD OVER — NOTED FOR QUALITY AND DURABILITY
VULCAN TOOL MFG. CO.
QUINCY MASS.

PORTABLE ASPHALT PLANTS
High Production—Low Cost

THE McCARTER IRON WORKS, INC.
NORRISTOWN, PENNA.

RELIANCE
CRUSHING, SCREENING and WASHING UNITS
● Up to 2000 Tons a Day ●
Crushers, Elevators, Sweepers, Screens, Wash Boxes
Bins, Pulverizers, Feeders, Spreaders, Kettles, Conveyors
Drag-Lines, "GAYCO" Centrifugal Air Separators
UNIVERSAL ROAD MACHINERY CO.
Kingston, N. Y.
Canadian Representatives: F. H. Hopkins & Co., Ltd. 140 Canada Cement Co., Montreal, Que., Can.

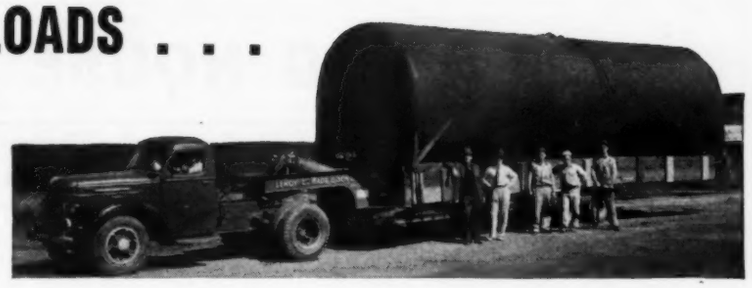
ARIENS AGGMIXER
FOR SECONDARY ROAD CONSTRUCTION

The swirling, chopping action of these tines does a thorough job of mixing, wet or dry.
Here's equipment designed especially for mixed-in-place construction — to operate in connection with other general purpose equipment. Wherever aggregates are used it thoroughly pulverizes, mixes and aerates aggregates with binder—rapidly and economically. Also ideal for soil cement stabilization. Safe and easy to operate . . . adjustable to any tractor . . . made 4 standard sizes, 4', 5', 6' and 7'. Write for details.
ARIENS COMPANY
BRILLION, WIS.

SAFE FOR UNUSUAL LOADS . . .

It takes a sturdy, well designed and properly constructed trailer to safely transport unusual and unbalanced loads. Heavy hauling is ALWAYS SAFE with a JAHN TRAILER.

JAHN TRAILERS ALL OVER the WORLD!
Reg. Trade Mark



Heavy duty trailers from 5 to 100 tons with any wheel or axle combination.

C. R. JAHN COMPANY
Dept. 1345
1106 W. 35TH STREET, CHICAGO 9, ILL.

Opens New Branch Offices

The Gardner-Denver Co., Quincy, Ill., has opened three new branch offices, bringing the total of domestic branch offices to 29. The new branch office in New Orleans, La., at 1034 Camp St. was opened Sept. 1, with M. B. Morrisette as branch manager. The new Cleveland office was opened Oct. 1 at 8015 Carnegie Ave. with R. A. Williams as manager. The new Kansas City office at 2805 Main St. was opened Oct. 15. E. C. Wallace is branch manager.

B. H. Johns Promoted

B. H. Johns, for the past seven years manager of the St. Louis branch of Independent Pneumatic Tool Co., Chicago, Ill., has been appointed manager of the company's mining and contractors tool sales division, with headquarters at Chicago. W. B. Smith, former manager of the Houston branch succeeds Mr. Johns as manager of the St. Louis branch, and R. F. Caslin, former Thor electric tool service engineer in the Houston territory, succeeds Mr. Smith as Houston manager.

New Lima Distributor

Wilhelm-Davies Co. Inc., North Colony Road, Wallingford, Conn., has been appointed sales agent for the state of Connecticut for the complete line of Lima shovels, cranes and draglines of Shovel and Crane Division, Lima Locomotive Works, Inc., Lima, Ohio.

Moves Offices

The Matt A. Doetsch Machinery Co., Distributors, has removed its offices from Bond Bldg., to 508-9 Central Bldg. 8th and G Sts., N. W., Washington, D. C.

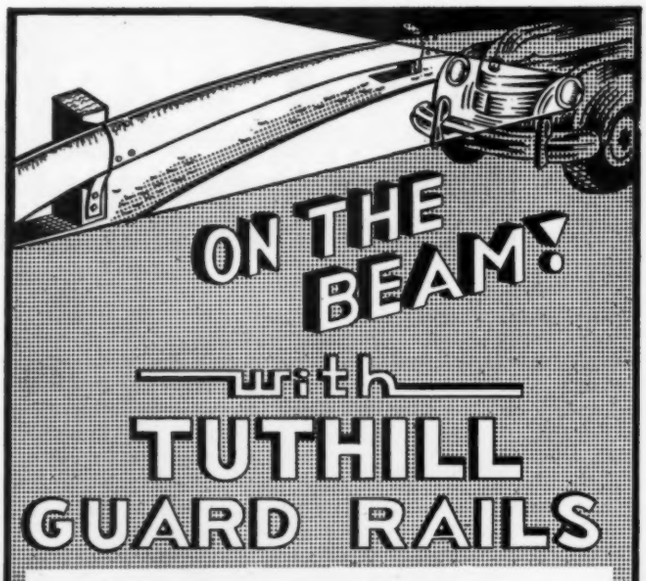
Raybestos Promotions

Raybestos-Manhattan, Inc., Passaic, N. J., has announced the following appointment in its Equipment Sales Division: Harry C. Dishman, equipment sales manager with headquarters in Detroit; George T. Young, branch manager of the Detroit Office; E. E. Juergens, branch manager of the Cleveland Office; and John E. Cole, branch manager of the Chicago Office.

Edsall Promoted

Promotion of Dwaine Edsall to production manager of the Akron plant of The General Tire & Rubber Co., was announced recently by Harold J. Harmon, factory superintendent. He succeeds Harmon, who vacated the position of production manager after his recent promotion to factory superintendent.

Concrete
VIBRATORS and GRINDERS
Write for Circular on types, sizes and Prices
ELKHART White Mfg. Co. INDIANA



ON THE BEAM! with TUTHILL GUARD RAILS

They keep traffic off the shoulders and on the road. Convex, spring-bracket, steel panels absorb and deflect impacts, keep cars from plunging over embankments. Easy to see. They beautify the highway, too; rounded end-pieces give extra neatness.

Choose Tuthill Guard Rails. They are economical to buy, to install, and to maintain. REQUEST DETAILS

TUTHILL SPRING CO.
761 W. POLK STREET, CHICAGO 7, ILLINOIS

CLEARING HOUSE

Engineer Wanted as Construction Editor

Exceptional opportunity for graduate civil engineer with interest in editorial career. Old established national magazine. Road or airfield design or construction experience desirable. Must know practical photography. Some traveling. Will help develop right man. Salary $3600-$4800 depending. Reply strictly confidential. Address Box 112, ROADS AND STREETS, 22 W. Maple St., Chicago 10, Ill.

Ford-Ferguson Tractor
For Sale

Early model—tires worn but in excellent serviceable shape with front-end Detroit Sweeper.

New Price $1,800. First $1,300 takes it.

Clifford Waterhouse

"Just a Whisper From Stribling Bros."

Jackson, Mississippi

EXPORT EXECUTIVE

44 years old, world-wide travels, college man, five languages, former Principal Consulting Engineer of U. S. Board of Economic Warfare, with private apartment office in Chicago, desires export representation of construction and road machinery builders. Also interested in employment by desirable concern. Willing to go overseas. Reply Box 111, Roads & Streets, 22 W. Maple St., Chicago 10, Ill.

SURPLUS CONTRACTORS EQUIPMENT

1 Allis-Chalmers Superior Mc-Cully 10 in Gyratory Crusher No. 7971, —1,350.

1 Worthington Superior Mc-Cully 8 in. Gyrator Crusher No. 1134, $1,150.

1 Speeder-B2 ⅝ yd. capacity shovel, $5,500.

All quoted prices F.O.B. Milwaukee, Wis., subject to prior sale.

Phone or write for appointment.

F. W. CHELLIG

1737 N. 30th St., Milwaukee 8, Wis.

Kilbourn 1545 or 2780

WANTED IMMEDIATELY

CATERPILLAR D7 TRACTOR—9G MODELS

CATERPILLAR D4 TRACTORS—with or without TRACKSON HI-LIFT

Box 110—Roads & Streets

22 W. Maple Street, Chicago 10, Ill.

HOSE SALE

Brand New 4-Inch

SUCTION HOSE

USES: Portable Pipe Lines; Handling Water, Liquids, etc.; Sewer & Trench Work; Manholes; Suction or Discharge on Pumps; Mines; General Heavy Duty suction work, etc.

DESCRIPTION: New Heavy-Duty 4-inch inside diameter steel-reinforced Suction (or Discharge) Hose complete with male and female fittings. Abrasion-resistant rubber; heavy steel wire reinforcing; plies of heavy fabric. All in 10-ft. lengths complete with fittings. Smooth bore. Couplings are built-in, full-flow, with fixed lug nuts on one end and hand lug swivel nuts on other end; recessed to hold washer in place when hose is disconnected; Eliminates necessity of using wrench.

SALE PRICE is less than ONE-FOURTH the regular NEW PRICE

PRICE per 10-ft. length complete with male and female fittings, brand new. **$12.00**

BERNSTEIN BROTHERS

SINCE 1890

Pueblo, Colorado **Phone 8404**

ETNYRE

"Black-Topper"

BITUMINOUS DISTRIBUTORS

ACCURATE...DEPENDABLE...ECONOMICAL

Reduce labor costs, save time, minimize maintenance with an Etnyre "Black-Topper". Covers roads up to 24 feet wide in one trip...low-cost operation...accurate and dependable. See your Etnyre dealer or write us today for complete details.

E. D. ETNYRE & CO., Oregon, Illinois

FOR SALE

5—Osgood Model 200-½ Yard Capacity. Combination Backhoes, Draglines and Cranes. All new models.

2—TD 18 International Bulldozers with 12 Fot. Angledozer. Rebuilt.

1—D-4 Caterpillar Tractor used 500 hours.

1—Cletrac Bulldozer—Model CG-Rebuilt.

1—Sargent Overhead Loader on Cletrac Tractor—Good as new.

1—Allis-Chalmers Front End Loader on Rubber Tires.

1—Barber-Greene Trencher 5½ Foot—Rebuilt.

5—160 Davey Compressors Mounted on Trucks—New 1947.

2—105 Davey Compressors mounted on Trucks—New 1947.

3—160 Worthington Compressors mounted on Trucks—New 1947.

1—McKiernan-Terry Air Hammer No. 2—New.

1—Littleford Roller for Driveways.

1—Westinghouse 300 Amp. Stationary Welder.

Buckets—Clamshells, Draglines ⅜ Yard & ½ Yard.

Pick-up Trucks and Dump Trucks.

All machinery—immediate shipment

Write to J. A. Laporte
Wilson Boulevard at Barton Street
Arlington, Virginia

Inquiry Blank and Advertisers' Index

Check reference to advertisement or to items of equipment or materials on which you wish to receive information. Give your name and address in the space at foot of page (if convenient, please print or use typewriter), detach page and mail to ROADS AND STREETS, Readers' Service Department, 22 West Maple Street, Chicago 10, Ill. We will pass your inquiry along to manufacturers and see that you get desired information promptly.

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Check other products below on which you wish us to obtain information for you:

AGGREGATE:
- ☐ Bins and Hoppers
- ☐ Conveyors
- ☐ Crushers
- ☐ Portable Plants
- ☐ Screens

BITUMINOUS:
- ☐ Batchers
- ☐ Finishers
- ☐ Distributors
- ☐ Dryers
- ☐ Heaters
- ☐ Plants (central)
- ☐ Plants (travel)

CONCRETE:
- ☐ Batchers
- ☐ Buggies and Carts
- ☐ Finishers
- ☐ Joints, Expansion and Contraction
- ☐ Reinforcement Accessories
- ☐ Metal Road Accessories
- ☐ Mixers (under 1 yd.)
- ☐ Mixers (1 yd. up)
- ☐ Pavers
- ☐ Reinforcing Steel
- ☐ Road Forms (1000' set)
- ☐ Tower
- ☐ Truck Mixers

CRANES:
- ☐ Crawler Mounted
- ☐ Truck Mounted
- ☐ Piledrivers

GRADERS:
- ☐ Blade, self propelled
- ☐ Blade, pull type
- ☐ Blade, under truck
- ☐ Elevating

LOADERS & TRENCHERS:
- ☐ Front-end loader (tractor mounted)
- ☐ Loader, bucket type and belt type
- ☐ Trencher or Ditcher

HAULING EQUIPMENT:
- ☐ Dump Trucks, self-powered
- ☐ Dump Wagons, tractor drawn
- ☐ Flatbed Trailers
- ☐ Other Trucks

PUMPS:
- ☐ Centrifugal
- ☐ Concrete
- ☐ Diaphragm
- ☐ Mud Jacking
- ☐ Piston
- ☐ Wellpoint

POWER UNIT: (Independent)
- ☐ Gasoline
- ☐ Diesel
- ☐ Electric

ROLLERS:
- ☐ Power (Smooth)
- ☐ Pneumatic Tire
- ☐ Sheepsfoot

TRACTORS:
- ☐ Crawler
- ☐ Rubber-Tired

TRACTOR EQUIPMENT:
- ☐ Dozers
- ☐ Power Control Units
- ☐ Rippers
- ☐ Scrapers, tractor drawn
- ☐ Scrapers, self-powered

BUCKETS:
- ☐ Clamshell
- ☐ Concrete
- ☐ Dragline
- ☐ Orange Peel

SHOVELS & DRAGLINES:
- ☐ Crawler (under 1 yd.)
- ☐ Crawler (1 yd. up)
- ☐ Truck Mounted

ROCK DRILLS & AIR TOOLS:
- ☐ Air Compressors
- ☐ Backfill Tampers
- ☐ Clay Diggers
- ☐ Concrete Vibrators
- ☐ Drills, cabel tool
- ☐ Drills, tripod and wagon
- ☐ Drills, rock, hand-held
- ☐ Paint Sprayers
- ☐ Paving Breakers
- ☐ Riveters and Chippers

MISCELLANEOUS:
- ☐ Buildings, portable
- ☐ Earth Drills, power
- ☐ Light Plants
- ☐ Lubrication, Service Truck
- ☐ Mowers, Highway
- ☐ Power Saws
- ☐ Soil Stabilizing Equipment
- ☐ Snowplows, rotary
- ☐ Snowplows, v or wing
- ☐ Spreaders, sand or cinders
- ☐ Street Flushers
- ☐ Street Sweepers
- ☐ Welders
- ☐ Cutting Torches
- ☐ Hydraulic Jacks
- ☐ Hydraulic Control Equipment
- ☐ Hand Tools
- ☐ Hoists, derrick type

Be sure to fill in name and address below:

Your Name.....Title or profession.....

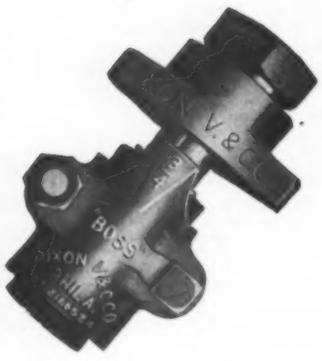
Name of your company or governmental department.....

Type of work for which equipment will be used.....

Street Address.....

City ..... State ..... County .....

It's DIXON . . . for Reliable Air Hose CONNECTIONS



"G J-BOSS"
AIR HAMMER COUPLING

A *washerless* coupling for all heavy duty service. Made of tough, durable malleable iron and steel, cadmium plated. Copper insert in spud provides leakproof, soft-to-hard metal seal. Powerful grip of "Boss" Interlocking Clamp is proof against blow-offs. Furnished in compact or heavy patterns, with male or female spuds.

"AIR KING"
Quick-Acting, Universal
HOSE COUPLING

Built for rough outdoor work, as well as shop and factory service. Plain design—no parts to get out of order. All locking heads identical in size, regardless of hose shank or I.P.T. size. A twist of the wrist makes or breaks connections; but patented safety locking arrangement prevents coupling from coming apart in spite of severest vibzration. Pipe ends, ¼" to 1". Hose ends, ¾" to 1". Malleable iron, cadmium plated, or bronze.

Stocked by Manufacturers and Jobbers of Mechanical Rubber Goods

DIXON
VALVE & COUPLING CO.
Main Office and Factory: PHILADELPHIA, PA.
BRANCHES: CHICAGO · BIRMINGHAM · LOS ANGELES · HOUSTON

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This is my ACCIDENT RECORD

• There is no doubt about it, Hazard LAY-SET Preformed is definitely a safer wire rope for your men to handle. In the first place, when the outside crown wires finally do break, the broken ends remain in place. Being preformed, they refuse to wicker out to become vicious jaggers that tear men's hands and start blood-poison. Many companies have standardized on LAY-SET Preformed because of this single feature. A wire rope that has been kinked or dog-legged is an unsafe rope to use. LAY-SET resists kinking. A wire rope that is hard to handle is more dangerous than the flexible, limber, easy-to-handle LAY-SET Preformed. For safer, faster, steadier production, insist on Hazard LAY-SET Preformed of Improved Plow Steel.

ACCO

Wilkes-Barre, Pa., Atlanta, Chicago, Denver, Houston, Los Angeles, New York, Philadelphia, Pittsburgh, Portland, San Francisco, Seattle, Tacoma, Bridgeport, Conn.

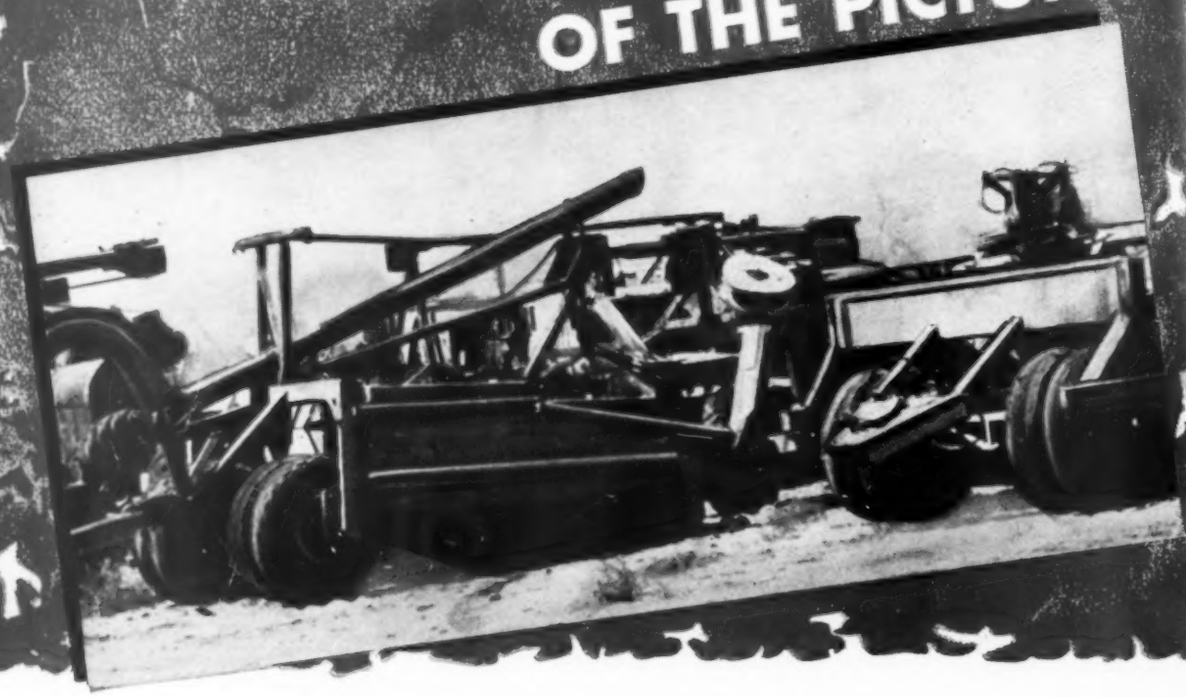
HAZARD WIRE ROPE DIVISION
AMERICAN CHAIN & CABLE

HAZARD WIRE ROPE 101 YEARS OLD 1846 • 1947

TRADE MARK

In Business for Your Safety

KEEP RUST OUT... OF THE PICTURE



WHEN YOU lay up your equipment, brush *Texaco Rustproof Compound* over all exposed metal surfaces. They'll be safely and economically protected against rust by a soft, self-healing, *waterproof* film that removes easily when your equipment goes into service again.

Texaco Rustproof Compound not only prevents rust from getting a start on clean metal — it also gets right under existing rust, stops it from going further, and loosens it for easy removal. *Texaco Rustproof Compound* never hardens or chips off. It lasts long and costs little. In fact —

The cost of rustproofing every machine in your yard with *Texaco Rustproof Compound* is far less than the cost of repairing the possible rust-damage to just one piece of equipment.

Keep rust out of *your* picture this winter. Get *Texaco Rustproof Compound* and helpful suggestions for its use from the nearest of the more than 2500 Texaco distributing plants in the 48 States. Or write The Texas Company, 135 East 42nd Street, New York 17, New York.

EFFECTIVE PROTECTION FOR METAL EVERYWHERE

Use *Texaco Rustproof Compound* to protect metal everywhere. Gas holders, water works, sewage disposal plants, bridges — wherever metal is exposed to weather, or corrosive chemicals and fumes — *Texaco Rustproof Compound* gives protection at low cost. Texaco's 36-page book "Rust Prevention" tells the whole story, offers many money-saving suggestions. Write for your copy today.

TEXACO REG. T.M.

TEXACO Rustproof Compound

Tune in . . . TEXACO STAR THEATRE presents the TONY MARTIN SHOW every Sunday night. See newspaper for time and station.